Managing a Cow-Calf Business

An Essential Guide

RENEWAL.

Canada

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Managing a Cow-Calf Business
A Sequential Guide

Introduction

The traditional Alberta cattle rancher was a cowboy on horseback viewing his herd of healthy cattle in lush green pastures with ample water stores. He was a steward of his land and cattle. What you don't see in this picture are the underlying business and environmental principles that a producer must manage and adapt to ensure his operation is sustainable.

This manual is meant to be a guide for adults who have an agricultural background and an interest in starting a cow-calf operation. It is targeted at beginning operators, or operators who have not moved beyond the basic principles of "running" cows. All management areas required in a successful operation are covered: big picture management, financial and economic management, marketing, operational management, the environment and people management. As you go through this manual, you will see how all the different aspects of an operation are linked. To be successful, you will have to manage all of these aspects, rather than focus on only one or two.

Each manual section starts with a general overview, key factors and basic concepts and strategies to consider for proper cow-calf management. While the manual is reasonably thorough, it does not cover extensive detail for each topic, as that approach would require volumes of literature. Instead, this document will introduce each topic and provide more in-depth information through references, footnotes and weblinks.

A CD is also provided to reinforce particular topics and to assist in the learning process. The following icons are used to alert readers to specific features:

💿 Further details on the CD

📄 Example

💻 Weblink provided for your reference

🔑 Key points/summary area to make you aware of the most important take-home messages.

At the end of most sections, and at the end of the manual, you will find a checklist or an outline of key points. Use these resources to apply the information from the manual and CD to your operation.

Each section's Table of Contents contains topics and sub-topics that provide order to the manual and an overview of the breadth of topics discussed.

Course Objectives

After completing the manual, you will be able to:

- *Create a goal-based system of business and production that will lead to the fulfillment of personal, family, production and environmental goals*
- *Implement key management areas of a cow-calf operation to fulfill your goals*
- *Explain how planning, production, economics and finance, marketing, human resource management and the environment are all linked and are equally important in having a successful operation*
- *Create a framework to start a cow-calf operation.*

Managing a Cow-Calf Business
Big Picture Management

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Overview

You got to be careful if you don't know where you're going, because you might not get there. (Yogi Berra). Planning is important because it guides you to where you want to go. Although plans change, and need to be adapted, they keep you focused, and ensure you make decisions that lead you to your goals.

This section focuses on the development of two types of plans: strategic and operating plans. These will form part of the overall business plan. This section also outlines the basic elements of a plan, and why each part is important. Some business plans are huge documents, while others are just a few pages. The size of the document does not determine the success rate, but research has shown that businesses with a business plan on paper have a higher success rate. The value of a plan generally comes from the process, rather than the actual document itself. When you are finished with this section, you will have the tools required to develop the framework for a simple yet solid plan for your business. Remember, planning is vital to the long-term success of your business.

Learning Objectives

The producer will:

- *Understand that the goals for a cow-calf operation are based on the combination and overlap of personal, family and business goals*
- *Develop a strategic plan for a cow-calf operation, and know how to use it and for what it is intended*
- *Gain an understanding of systems management and the links between production, marketing, finance and the environment in which a cow-calf business functions*
- *Learn about different business arrangements and discover which ones are personally applicable*
- *Learn the basics of succession planning.*

Strategic Plan

Strategic planning involves identifying the long range vision and goals of an organization and determining the objectives and appropriate strategies to get there. In other words, where would you like to see your cow-calf business in five to ten years and what do you have to do to get it there?

Strategic Planning
Where would you like to see your cow-calf business in five to ten years and what do you have to do to get it there?

Elements of a Strategic Plan

1. Vision Statement–A statement of what the future of you and your farm will look like; essentially it is what the farmer and farm family want to create in the next five to ten years.
2. Mission–The mission statement defines the purpose or mission the organization attempts to perform in society. The statement should concisely describe what the company does, for whom and why.
3. Values–General standards or guidelines that are important to your farm and farm family.

4. Situational Analysis–Process of identifying and understanding how your business is positioned within the environment you operate, both internal and external. This is commonly referred to as a SWOT analysis (**S**trengths, **W**eaknesses, **O**pportunities and **T**hreats). Strengths and weaknesses are related to factors that are internally controlled, such as personal skills or specific attributes of your operation. Opportunities and threats are outside your operation but affect the industry as a whole, such as trade, exchange rates, consumer demand, etc.

5. Goals–What are the major achievements you would like to accomplish in the next three to five years?

6. Objectives–Specify how a goal will be achieved.

7. Critical Success Factors–The areas of performance critical to the long-term success of the organization. They can be used to measure growth, development and achievement.

8. Plan of Action–Strategies and actions implemented to meet targeted objectives.

Simplifying the Strategic Plan

Including all of the above elements might work well for a bank or oil company, but it is not practical to expect you to develop your own in-depth strategic plan, similar to a large corporation. Detailed plans do have their place but can be overwhelming if you have not been previously exposed to the concepts. You don't have to build the perfect mousetrap the first time out. So instead we are going to simplify the process by breaking it down into three simple questions:

- Where are you now?
- Where would you like to be?
- How do you plan on getting there?

Answering these three questions addresses most of the steps previously mentioned but makes the process simpler and more concise. With the basics in place, you may choose to move to the more complex analysis at a later time.

Consider taking a management course within the next three years to help you with this process. Another alternative is to hire a business specialist experienced with this process to help you and your partner(s).

Issues that might appear on a cow-calf producer's list include:

- **Expansion**
  How do I expand profitably with rising land prices?
- **Employees**
  How do I retain good employees in the midst of high wages paid in the oil and gas industry?
- **Value Added**
  Will I raise organic or natural beef?
  Will I process?
  Will I compete in a niche market?
- **Succession Planning**
  What am I going to do with my business when I want to slow down or retire?
  What happens to the business if I'm suddenly removed from the operation?
- **Shrinking Profit Margins**
  How do I react to declining prices and increasing operating costs?

Where are you now?

"Where are you now?" is an in-depth look at all the factors that will have the greatest impact on the future of the business. When you ask yourself this question, focus on the four areas of your business: customers, operations, human resources and finance. This is where the SWOT analysis can be used. For each of the four areas of your business, you can assess the strengths, weaknesses, opportunities and threats.

Once you have done this, identify and prioritize the issues that affect whether the business can achieve its goals. Defining your issues is not a simple task. Take time to ensure you have identified the correct issues.

Where would you like to be?

Answering this question generally involves establishing goals and objectives. You must be asking the question, what's the difference? If you refer to Webster's Dictionary the definition for goals and objectives are almost identical, but when these terms are used in the context of planning, goals are desired outcomes that you want to accomplish in the long-term (three to five years). Objectives are short-term and identify how the goals are to be reached. More detail on objectives is discussed further in the "Objectives" section.

For example, to support the financial needs of family and the ranch, the ranch's management team has agreed to increase the farm's gross income to $150,000 in three to five years. Once the goal is established, an objective is then drawn up to explain how the goal is to be achieved, by when and by whom. For example, in order for the business to increase gross income to $150,000, the family has decided to focus on increasing their pasture stocking rate from 1,000 animal unit months (AUMs) to 1,250 AUMs. (An animal unit month is defined as the amount of forage required to feed a 1,000 lb. cow with or without a calf for one month.)

Personal, Business and Family Goals

Once you have assessed your current position, the next step is to determine where you would like to be in the short and long-term. A worksheet for this exercise is available in Appendix 1.

We recommend that family members complete the worksheets individually and not discuss their thoughts prior to completion. Once completed, family members should meet and discuss their responses. You are looking for areas of commonality and divergent thought. Note that there are no correct or incorrect opinions. It is important for all individuals involved in the planning process to know what each other's personal, family and business goals are for the next few years. For example, it is important to know before commencing the planning process if one of the individual's goals in five years is to purchase another section of land while another individual's goal is to build a new house. This divergent thinking is not wrong, but it must be understood.

If you or your family are uncomfortable sharing your personal goals and ambitions, it may be a good idea to have a third party compile the information and share the results with the group. It may also be necessary to involve an expert if there are areas of major conflict that have proven impassable by the participants.

Once everyone's goals are aligned, the next step is to discuss and determine how the business can be adjusted to meet the needs of the families involved and at the same time sustain the profitability and viability of the business. To do this, establish three to five goals that you feel are critical to the long-term success of the business. Some generic examples may include:

- Increase the profit of the operation
- Increase production in the beef operation
- Increase efficiencies
- Improve information technology systems to manage the business.

The following definitions may assist you in completing the goal sheet in the Appendix on page 18:

Personal Goals–these are objectives that you as an individual member of the farm team would like to accomplish over the next three to ten years. Examples may include working fewer hours than you currently do or furthering your education by gaining a better understanding of commodity markets, or accounting and production programs, etc.

Family Goals–these goals are more focused on your family unit and their long-term plans, and may include setting aside funds to provide for university for the children, retirement for the senior members of the farm team, or a desire to take an annual two week family vacation.

Business Goals–these three to five year objectives are focused mainly around the farm unit as a business entity. Goals such as maximum amount of debt being carried, net worth of the shareholders of the farm, or production goals such as possibly owning or controlling X number of acres fall within this category.

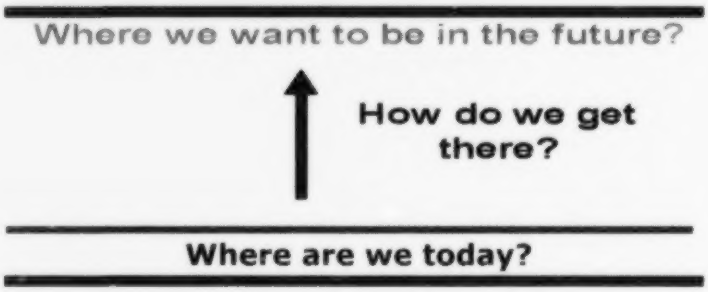
*The **SMART** checklist provides a simple formula to follow in deciding whether your objectives are sound:*

- **Specific**
  Do your objectives clearly define the end result?
- **Measurable**
  Are your objectives measurable and quantifiable?
- **Attainable**
  Are your objectives feasible or are they a stretch?
- **Results Oriented**
  Do the results link to your goals?
- **Time Limited**
  Is it clear when the results are to be accomplished?

Gap Analysis

Prior to moving on to implementation, assess the gap between where you are and where you want to be. One of the pitfalls of planning is setting unrealistic goals with limited and/or unsuitable resources. Refer back to the situational analysis to ensure your goals are based on your operation's actual circumstances and not on some delusion of grandeur.

The gap analysis will also prove valuable as you move into the implementation stage. It will enable you to compare actual performance with planned performance. This will be explained further in the "Review" section.



How do you plan on getting there?

Getting there is the final and probably the most crucial step in the planning process. A plan has almost no value until it's implemented.

Objectives

You know where you're at and your goals are now established. Now it's time to spell out how they will be achieved. Using the previous example, you may have several ideas on ways to increase gross income to $150,000. In addition to the ideas already mentioned, you could alter your marketing strategy, change breeds, increase land base and diversify your operation.The problem with having so many options is identifying those that will have the biggest impact on income, can be completed in a timely fashion, and have a team member with time and skill to make it happen.

A worksheet is available in **Appendix 1** to help you with your objectives. Remember that the objectives need to be aligned with your goals and each goal may have multiple objectives.

Action Plan

Once family members have agreed on which route to take, each objective will have an action plan. This plan will outline what needs to be done to achieve the objective, delegate responsibility, allocate resources and manage progress. Record who is responsible for each action plan, what resources are necessary and when it is to be completed. When drafting your action plan, make sure the actions are measurable. It's not uncommon to focus on the objective, but how will you really know if it was your actions that led to the planned result?

FOR EXAMPLE

You want to increase your pasture's stocking rate. If the increase is the result of above average precipitation and not an improved range management program, what happens when it doesn't rain? Will the stocking rate fall back to its original state?

Performance Measures

Performance measures provide feedback on the objective outcome and are critical to the review process. Did you reach your objective or not? Performance measures are quantifiable, usually financial and/or production focused, timely and readily available.

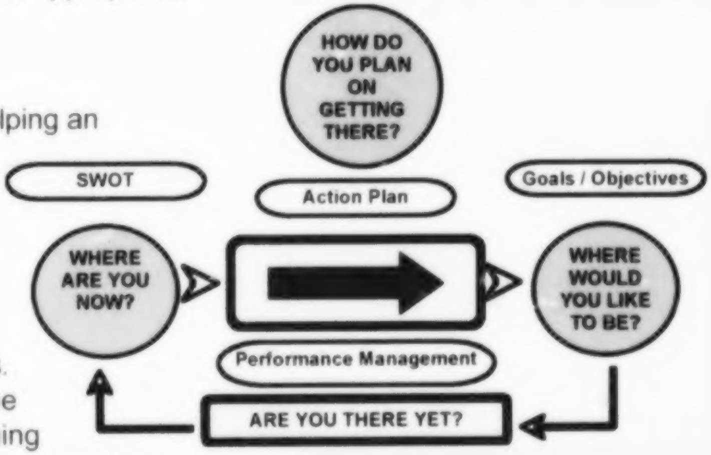
As previously stated, the objective was to increase pasture stocking rates. To accomplish this, you have chosen to integrate rotational grazing, use legumes in the pasture and increase fertilization. To evaluate the outcome, AUMs will be calculated at the end of the year, animal performance reviewed (average daily gain) and pasture conditions assessed (growth rate and forage height).

Review

Plans change and so do their results. Treat your plan as a living, breathing document. Schedule regular review dates and take corrective action when appropriate.

Systems Management

Systems management is a way of helping an organization view systems from a broad perspective that includes the overall structures, patterns and cycles in the system rather than seeing only specific events. Simply put, it's understanding how things work and their interrelationships. The Systems Thinking diagram to the right demonstrates the overall planning process and the interactions between its parts.



Marketing Plan

Are You a Good Farm Marketer?

How many farm managers "sell" their crops or feeders when they think the price is right or when they need cash flow? Someone once said that **selling is just getting rid of what you have**.

Astute farm managers "market" their crops. **Marketing is planning to have what you can sell at a good price.**

This line and the following link is a great opening article for beef managers (and is applicable to crop operations as well; therefore, it is suitable for most mixed farms).

From Market Clippings: Are You a Good Farm Marketer?
http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/sis5220

Operating Plan

If the strategic plan is defined as the "game plan", the operating plan can be defined at the "game". The operating plan outlines the day-to-day activities of the business including what gets done, how it is done, who does it and when it is done. The operating plan is generally shorter term and usually revolves around a production cycle.

The operating plan can be divided into four key sub plans:

- Production plan
- Marketing plan
- Financial plan
- Human resource plan.

Production Plan

What will be grown or processed to be sold?

- For the cow-calf producer, this may entail two main components. The first is the cow-calf enterprise including calves, breeding and replacement livestock. The second is the crop enterprise such as number of acres and type of commodity to be grown to support the herd. As the producer, you should identify all types of enterprises on your farm (i.e., for cattle, cow-calf to weaning, background, finishing, pasture, hay or alfalfa, etc.)
- The producer should then draft a budget for each enterprise.

The producer should identify production resources including:

- Land base including irrigated acres, dry land acres, pasture acres. The acres should be identified as owned, rented, leased, community pasture, etc.
- Equipment base including cattle equipment, cropping equipment and transportation units
- Buildings and structures including barns, corrals, shops and storage facilities.

Financial Plan

At minimum the financial plan usually includes a balance sheet, an income statement and a cash flow statement.

The financial plan should describe the financial requirements and projections to implement the plan and describe the assumptions on which the financial plan is based including:

- Revenues (quantities sold and the respective price)
- Expenses (operating and production expenses; overhead expenses such as interest, depreciation, wages, etc; family living costs)
- Describe financial results through historical and future balance sheets, income statements and ratio analysis. Additionally, the financial results will generally provide a statement of cash flow that describes sources of cash including a financing schedule (principal repayment allocation, source, amount, timing, type and terms).

The financial section should include a financial model of your business that is a simulation process that will forecast the financial impact of your day-to-day activities. For example, if you choose to purchase an additional 50 cow-calf pairs, can you cover the operating costs, service the debt, compensate yourself for the additional labor and see a return on your investment?

Human Resource Plan

The human resource plan will describe the human resource issues facing the business and how they will be addressed. The human resource plan should further describe the people required to operate the business, their general responsibilities or title, their skills, their availability and any training programs needed.

Balanced Scorecard

The health of any business is not solely based on financial results. For a business to thrive, it must have excellent customer relationships (marketing), strong operational capabilities (production), and a highly skilled and motivated workforce (human resources), as well as produce strong financial results. The production, marketing and human resource measurements are leading indicators for success. Financial results are lagging indicators.

The remaining sections of this manual all fall into one of the four categories of the operating plan.

Tying it All Together

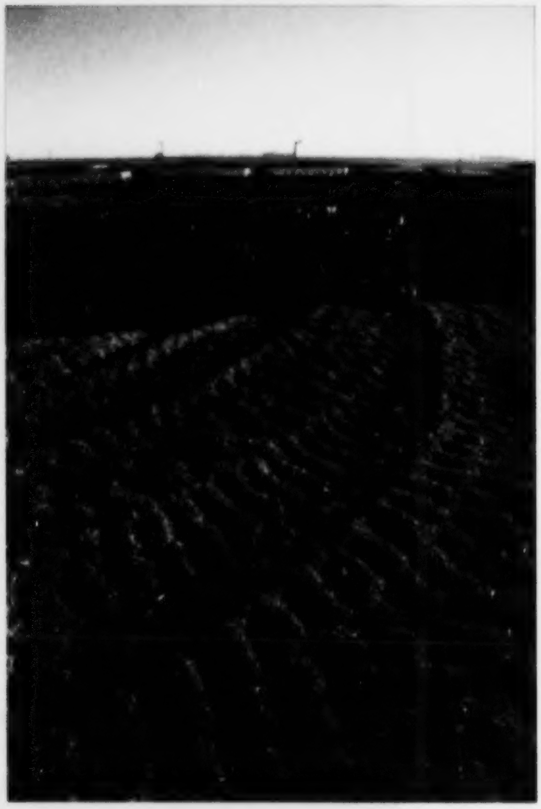
The main goal of each sub plan should be to help your farm become more successful. A structured approach helps the farm manager become more comfortable in making business decisions.

Strong managers integrate all four sub plans into their business.

Historically (60s, 70s even 80s) all that was needed was to produce a healthy calf crop and sell to the auction market. Why? Margins were higher. Margins have continued to shrink over the last several decades.

Today all managers need to have equal focus on their financial health, promote strong marketing and production principles and manage their human resources to remain a viable business.

Up-to-date production technology (genetics, feeding efficiencies, manure management, electronic record keeping) will help with production efficiencies, but it won't ensure financial success.



None are independent; all are connected. No one sub plan is more important than the other.

Production results impact your marketing plan (you can't sell what you don't produce).

Marketing decisions have an impact on your financial health and production decisions.

Financial strength, such as working capital, affects your ability to market at more opportune times (who you sell to and when).

If you can't attract or retain employees, you are likely to focus the majority of your time on the production portion of your business at the expense of the financial and marketing aspects.

All four components equal an integrated and balanced management approach.

Succession Planning and the Family Business

Succession planning entails developing a continuity plan for your business and determining the process of transitioning a business to new owners. The transition may be an outside sale or passing the business down to the next generation.

Did you know that 80 percent of all businesses in Canada are family-owned and operated? Yet in a survey by the Canadian Federation of Independent Business (CFIB), only one-third of small and medium-sized enterprises are currently planning for their future succession.

Succession planning is critical to any business but is often not a priority. This is because most don't realize how important succession planning is for business families. Many people also think they don't have enough time to plan. In reality, a lack of adequate time is a major reason behind failed succession plans.

Facing the Challenges of Succession

The biggest challenge to succession is not having a plan at all. But according to the CFIB, 60 percent of small business owners feel it's too early to plan–a common misconception.

Other challenges for business families may include a strong sense of personal attachment to the business, issues within the family (such as a lack of communication, disjointed goals or outright conflict), a lack of available financing of their successor, and a lack of adequate advice and tools to start planning.

Poor planning may result in business stagnation and lower profitability. If the business is forced into crisis mode, the successor may not be the individual the original owner intended, leading to quarrelling among family members and, in the worst case, business failure.

Benefiting from Succession Planning

While every family faces challenges when considering succession, the majority agree succession planning offers major benefits. Benefits of succession planning include:

- Providing a plan for supporting and protecting your family
- Increasing financial stability and business value, as well as enhancing your chances for business success
- Increasing harmony among family members and employees
- Maximizing tax planning opportunities for all parties while minimizing future tax liabilities
- Helping to increase the confidence of your lenders and creditors

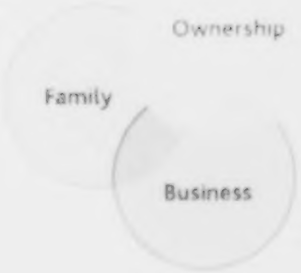
According to the CFIB survey, 86 percent of eventual successors believe that proper planning by the previous owner helped prepare them as future business owners.

Determine Your Vision: Start Building the Plan

Before you begin succession planning, you need to ask yourself and your family members to envision the future of the business. Developing a strong vision, and communicating that vision to family members, is the first step in building your plan.

To ensure you have a solid exit strategy in place, your succession plan should incorporate three key circles:

- Your family
- Your business
- Your ownership structure.



Your Family

Communication among family members is critical to a successful plan. Ask yourself these questions: What are our family's long-term goals? Do we share the same vision for the future? Is our family committed to maintaining our business? Your answers will have a major impact on your overall succession strategy and must be dealt with before any planning can begin.

Your Business

Clearly articulate your family's vision and translate it into a plan of action for the business. Ideally, you need to establish structures in the business circle as your operation grows and expands. Consider setting up a governance structure (both internal and external) that will help your family and its successors make business decisions. This includes regular meetings, shareholder agreements and a clear division of roles, responsibilities and accountabilities.

Ownership

Be sure you deal with ownership issues before they become critical. Family members may not know how to be effective business owners–it's a skill that must be learned. And even though most parents want to leave their assets to all their children equally, this can lead to succession problems if not all children are involved in your business and their objectives are not aligned.

Benefiting from Succession Planning

While every family faces challenges when considering succession, the majority agree succession planning offers major benefits. Benefits of succession planning include:

- Providing a plan for supporting and protecting your family
- Increasing financial stability and business value, as well as enhancing your chances for business success
- Increasing harmony among family members and employees
- Maximizing tax-planning opportunities for all parties, while minimizing future tax liabilities
- Helping to increase the confidence of your lenders and creditors.

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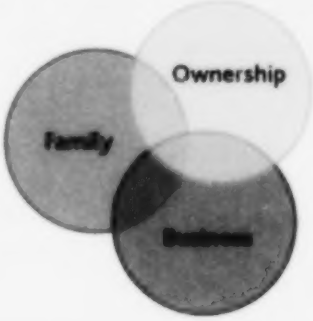

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Lessons Learned:
The keys to successful succession

Succession planning is a process and not a one-time event, so start planning early. Here are a few key points to remember:

1. Start planning at least five years ahead of your planned retirement date.
2. Set timelines for critical events in the succession process.
3. Find a common vision for your business and a plan for implementing it.
4. Have a system in place to govern decision-making, as well as roles, responsibilities and accountabilities.
5. Plan ahead and communicate regularly with all family members involved.
6. Involve a professional team to guide you and enlist the services of a qualified, objective advisor who can also work as a facilitator.

The Importance of Professional Advice

Professional guidance can help ensure that all succession planning considerations have been dealt with and help put a process in place to guide you through development and implementation.

Structuring Farm Ownership

Farmers should consider separating ownership of the business operation from the ownership of their business assets because of:

- Estate planning
- Credit management
- Income tax planning.

Proprietorship

Proprietorship is the simplest and most often used form of business organization.

The proprietor does not face legal complications and additional expenses required of a corporation and is not required to negotiate or be governed by agreements and need not register a business name.

The proprietor is personally liable for debts arising out of the farm. Personal as well as farm assets can be seized by creditors with respect to farm debts. Negligent acts committed by employees are the responsibility of the proprietor also.

The sole proprietor is an example of a "flow through" entity whereby the income and losses of the entity are considered to be those of the principal of the business.

General Partnership

The partnership is not a legal entity; however, property contributed to the partnership is deemed to be partnership property as is property bought with partnership money.

The name under which the partners trade is called the firm name and must be registered under the *Business Names Registration Act* of Alberta.

Each partner is jointly and generally liable for all debts and obligations of the partnership. Each partner can incur liability on behalf of all the other partners.

Unless the partnership has a continuation clause, a partnership dissolves automatically on the death, bankruptcy or insolvency of any partner, or if any partner has charged partnership property for a separate debt. Any partner may apply to the court for dissolution of the partnership.

A partnership is a "flow-through" entity; a partnership must file an information form each year similar to a tax return, setting out the income and losses earned by the partnership.

Limited Partnership

A limited partnership must consist of at least one general partner and at least one limited partner.

Declaration of limited partnership must be registered under the *Business Names Registration Act*. A new declaration must be filed for each change. Such changes are not effective until the declaration is registered.

A limited partner contributes capital and is generally restricted to the amount of capital contributed.

A limited partner may inspect the books of the firm and advise management. However, if the limited partner takes active part in the partnership business, that limited partner will be liable as a general partner.

Co-ownership

Co-ownership may occur when two or more persons own property jointly. Jointly owned property may be disposed of by will or by rights of survivorship.

Co-ownership is a method of owning property, but it is not an option for the ownership of the business.

There are two types of property co-ownership:
- Joint tenancy
- Tenancy in common.

An agreement setting terms of dissolution is necessary.

The agreement should also state directives including:
- A deceased co-owner's share of the property, passing by will to another individual, does not require the original co-owner to become a co-owner with a person who is undesirable for business reasons.

The agreement must be drafted very carefully to avoid the association being classified as a partnership.

Joint Venture

Joint venture generally refers to the joint relationship between parties; it is created in order to conduct a specific or limited commercial venture without creating a partnership.

This type of enterprise is used in farming, often as a temporary arrangement. For example, machinery and labor may be shared.

A written agreement should be generated to govern conduct and liability.

Choosing a Form of Business Organization

To decide what type of business organization is best, examine both personal and business goals. Whatever the goal, there is a business organization that will meet your needs. Your family goals may be to:

- Simplify your lives
- Bring your children into the business
- Involve all the children as stakeholders in the business
- Credit-proof your business.

Corporation

A corporation is a legal entity where the shareholders own the corporation through the ownership of shares.

A corporation is a separate legal entity, distinct from its shareholders.

The individual shareholder's liability is limited to his/her investment in the corporation unless the shareholder has personally guaranteed the obligations of the corporation.

A corporation can provide a very flexible framework in terms of succession from one generation to another. The owner may also give employees shares in the growth and profit of the operation without giving up management rights of a partner.

The initial and ongoing costs of incorporation are much higher than other business forms.

The main advantages of incorporation are:
- Low corporate tax rate
- Ability to average income due to the flat tax rate
- Transfer growth while retaining control
- Limited liability.

Trust

A trust is a relationship where legal ownership of the property is separated from beneficial ownership of the property. The advantages of a trust are:
- Parties can be involved in the operation even if they are not doing the day-to-day operation.
- The terms of a trust can be flexible to allow for changes in family circumstances.
- The income of the trust can be allocated to the beneficiaries so that the trust pays no income tax.

The disadvantages of a trust are:
- Trustees must be involved and there is usually a sale of property, which can create income where none is desired. It also creates complexities where none previously existed.
- Some income tax disadvantages: a trust is not permitted to allocate any losses it incurs to its beneficiaries and the *Income Tax Act* does not permit a tax-deferred sale of property to a trust.

Summary

Good plans shape good decisions. (Lester Robert Bittel)

An important point to remember about strategic planning is that the success of planning is not so much about the fancy documents, and amount of information, but taking the time to go through the process to determine where you want to go with your operation.

Remember the three key questions:

- Where are you now?
- Where would you like to be?
- How do you plan on getting there?

These questions will guide you through the planning process.

As you work through the manual, each of the sections gives the information required to help you make decisions for the operation plan. Keeping your strategic planning goals in mind will help you determine some of the decisions required for your operating plan.

Communication is a key part of planning, especially in a family business where there are personal, family and business goals that all need to be balanced. This is also a key part of a succession planning system.

In order to determine how the operation is carried on by new owners, everyone has to be given a chance for their input. Transferring an operation from one generation to another will be challenging, but without a plan and good communication, it is very difficult to keep everyone happy.

Take the time, before getting involved with production and marketing decisions, to work through the exercises discussed in this section in order to ensure your best chance of success.

Appendix 1, Action Plan Template

Goal:

Objective:

Date:

Activities/Tasks	Measurement	Costs/Resources Needed	Person Responsible	Results Achieved

Objective (check one)

☐ Met **☐ Not Met** **☐ Exceeded**

Managing a Cow-Calf Business
An Essential Guide

Genetics

Module 2: Table of Contents

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Overview

In a cow-calf operation, the term "genetics" refers to the physical characteristics of the cattle in your herd, characteristics such as color, size, conformation, milk production and meat production. Genetics is a huge and complex subject that can take years to fully understand, and so to delve into the details for the purposes of this manual is not practical; we would only scratch the surface. Instead, what we will focus on is a basic understanding of important genetic traits, how to select the right breed of cattle for your management style, and how the two combine to influence the profitability of your cow-calf operation.

Key Terms

Breed
A group of animals that have come to resemble each other through selection and breeding, and pass those traits uniformly onto their offspring. This usually refers to purebred animals.

Conformation
The body and muscular structure of an animal; physical characteristics.

Crossbreeding
The mating of animals of different breeds.

Dam
Breeding female.

Sire
Breeding bull.

Environment
The total of all non-genetic influences such as housing, feed, weather and management practices that impact animal performance.

Expected Progeny Differences (EPDs):
Estimates of the genetic value of an animal as a parent. Calculated for birth, growth, maternal and carcass traits, EPDs are used to predict differences in performance of an animal's future offspring when mated to an animal of similar genetic merit.

Phenotype
The observable attributes of a living organism, for example, hide color.

Learning Objectives

The producer will:

- *Recognize that management style, and feed and land resources, determine the physical traits a herd needs*
- *Learn to select breeding stock based on genetic evaluation and to interpret available information*
- *Understand basic differences between beef cattle breeds and variation within a breed.*

Choosing Breeding Stock

The foundation of profitable beef production is your breeding herd. Choosing the right breeding stock for your operation depends largely on your management system. The first step in making your decision about cattle genetics and what breeds you will run in your cow-calf operation involves understanding some of the measurable characteristics of beef cattle, known as traits.

Selecting breeding stock can be complicated. Some traits are common among breeds. For example, a number of breeds are similar in size. Some traits are breed specific, such as color or conformation. Some breeds of cattle perform better in certain situations than in others, and some cattle within a breed perform better than others.

No matter what breed or type of cattle you are looking for, there are critical factors for you to consider to have a productive cow herd. Factors such as conformation, correct feet and legs, correct udders and hardiness to cold weather are requirements for a sustainable cattle operation.

This section of the manual helps to simplify the selection process and provide some resources to help you make decisions.

Beef Breed Basics

There are two main groups of breeds used commonly in Alberta: British and exotic. British breeds were developed in the British Isles and were the first breeds of cattle introduced to North America in the 1700s. Common British breeds in Alberta include Angus, Hereford and Shorthorn. British breeds are generally characterized as smaller, earlier maturing cattle with excellent fertility and calving ease. These animals fatten easier than other breeds, but their meat contains a lower percentage of saleable product on the carcass.

Exotic cattle breeds originated in continental Europe. They were imported to Canada to improve the growth rate and leanness of the British breeds being used in the 1960s and 1970s. Some of the exotic breeds include Charolais, Simmental, Limousin, Gelbvieh, Salers and Maine Anjou. These breeds tend to be larger and yield more saleable product; however, beef from these animals tends to be leaner than beef from British breeds.

For the most part, both British and exotic breeds have adapted to Alberta's environment. Further south in the large beef producing areas of the United States, composite breeds have been developed using *Bos indicus* breeds of cattle, which originated in Asia and have adapted to tropical climates. These breeds include Santa Gertrudis, Simbrah and Beefmaster. These types of cattle are rarely, if ever, used in Alberta beef production.

Composite breeds are breeds that result from a planned mix of purebreds that has been conducted in a manner such that a consistent population is produced. Individuals of the composite breed can be mated to each other with subsequent generations retaining the same percentage of the original breeds. Advantages of a composite breed are consistently high heterosis and the possibility that the composite will be ideal in the environment for which it was specifically developed. On the other hand, some beef specialists argue that the heterosis is diminished after several generations.[1] An example of a composite breed used in Alberta is the Beefbooster. There are five seedstock strains of Beefbooster cattle that have been developed for selection of specific traits.

Heritability
A measure of the degree to which the variance in the distribution of a phenotype is due to genetic causes. Simply, it is a measure of how likely it is that a particular physical trait will be inherited by the offspring.

Heterosis
Heterosis is defined as the amount by which crossbred animals exceed the average of the purebred parents used for breeding, expressed in percent. This is also known as hybrid vigor.

Gene
The basic genetic unit by which characteristics are transmitted from parent to offspring.

Pedigree
A list of an animal's ancestors.

Performance
The observed traits of reproduction, production and carcass traits for an animal.

Selection
The process of determining which animals become parents. This decision is usually based on performance records.

Trait
Any measurable or observable characteristic of an animal.

Polled
An animal that does not have the horned gene. These animals carry the gene for the polled trait and naturally do not grow horns.

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[1] For more information on livestock breeding systems, please go to: http://www.extension.umn.edu/beef/components/publications/bcmu03.pdf

Selection

Tips to consider when selecting breeding stock:

- Conformation
- Correct feet and legs
- Correct udders
- Fertility
- Calving ease
- Animal performance
- Temperament
- Hardiness
- Timing of calving
- Winter feeding system
- Labor availability
- Breeding program
- Carcass traits
- Land resources
- Target markets.

Some of these factors can be measured using EPDs which are discussed later in this section.

There are over 250 breeds of cattle in the world; however, the majority of the genetics used in North American commercial beef production come from about 20 breeds. In Alberta, the most commonly used breeds include Angus, Charolais, Hereford, Limousin and Simmental, although there are other breeds gaining popularity for consumer driven characteristics.

Genetic Factors

There are two consideratons when selecting breeding stock.

First, producers need to decide what breeds will work best for their management system and, further to that, what breeds will work best in combination to achieve the desired results.

Secondly, producers need to select within those breeds to find the animals exhibiting superiority in the desired traits.

The following traits are among the major factors that cow-calf producers consider when selecting breeding stock. Performance in these areas has a direct effect on profitability. These factors tend to be breed specific. It is important, however, to select the right *combination* of traits for your management system, and not to rely solely on one trait to decide on breeding stock.

Cow Fertility

Cow/female fertility is critical to the efficiency of your cow-calf operation. If your replacement heifers are not able to be bred by 15 months of age, and your cows, on average, do not rebreed within three months of calving, it is difficult to keep a tight and consistent calving period with a calf per cow each year.

Poor fertility will result in younger and smaller calves at weaning, as well as inconsistent calf sizes. Cow fertility is a function of nutrition, breeding and proper management of animals given the feed resources available.

Cow Size and Growth

Cow size affects growth, weight gain, milk production and cost of feeding. Bigger cows require more feed to maintain their body condition. This becomes a critical consideration in Alberta's variable climate and landscape. In areas where feed availability tends to be limited due to moisture, a smaller sized cow may be preferable. In areas where feed availability is rarely a concern, larger cows may prove to be more economical and productive.

Milk Production

Milk production in a dam is a key trait related to productivity. Studies have demonstrated that the dam's milk production accounts for 50-60 percent of the calf's weaning weight and preweaning average daily gain. Therefore, it is desirable to have good milk producers in the breeding herd.

To balance this desired trait, it is also necessary to recognize that high milk producing cows have greater maintenance requirements than lower milk producing cows. Milk production must fit within the management standards and feed availability of the farm. Otherwise, cows will be either infertile and open in the fall or will be overweight and unproductive. Of the beef breeds, the Simmental and Gelbvieh exhibit some of the best milk production. The Hereford and the Charolais typically are lower milk producers.

Studies have demonstrated that the dam's milk production accounts for 50-60 percent of the calf's weaning weight and preweaning average daily gain.

Udder soundness is an important trait in beef cattle selection. It affects labor requirements at calving, milk production throughout the lactation and, ultimately, calf weaning weights. There are two main udder traits that indicate soundness: teat shape and udder suspension. Both of these physical characteristics affect the ability of a calf to nurse. Teats should be uniform and proportional to body size. They should not be funnel or balloon shaped. Udders should be well attached and firm. Poorly attached udders can become pendulous and are difficult for a calf to nurse. Poor udder soundness can also significantly reduce the productive life of a cow.

Adaptability and Hardiness

Alberta winters can be a challenge for beef cows. Ideal breeding females must be able to carry a calf through the harsh winter months, maintain good body condition, calve unassisted, produce sufficient milk for the growing calf and recover rapidly so that they can be bred again within 60-80 days of calving.

Some breeds are more adaptable than others. The Texas Longhorn is an example of one of the hardiest hot weather beef animals on the continent; these animals require virtually no management. However, they are not recognized for producing beef that grades well. Salers and Limousin are very adaptable, hardy cattle. The Chianina is an example of a breed that is less adaptable.

Polled versus Horned

With purposeful selection, the polled trait is becoming much more popular and is available in most of the popular breeds. This does have some management implications; with polled animals there is no dehorning required and no horns to contend with in older animals. Genetically speaking, the polled gene is "dominant" and the horned gene is "recessive". Selection for the polled attribute is becoming more popular because of the implications to the animal and because of societal concerns about animal suffering.

For more information on Beef Cattle Breeds, see: http://www.ext.vt.edu/pubs/beef/400-803/400-803.html

Carcass Composition

There are two main areas of carcass composition that beef producers need to understand and consider when selecting breeding stock.

Retail Product Yield: the percentage of the carcass weight that is trimmed, saleable red meat.

Natural Marbling: the amount of intramuscular fat. It is this fat that gives beef its characteristic flavor. Higher marbling generally means higher grading beef and, hence, a higher price. As the packing plant picks up the increased profit, it trickles back to the cow-calf producer through the bids that are obtained for calves at sale time.

There are observable differences between breeds in yield and marbling. British breeds tend to fatten early and are earlier maturing than exotic breeds. These breeds tend to yield less saleable meat but marble better than exotic animals. Exotic breeds can be taken to a heavier weight and still be relatively lean.

Temperament

Temperament is defined as an animal's response to handling by humans. Studies have proven that a beef animal's temperament affects its rate of gain and carcass quality. Quieter animals with good temperament are shown to have better growth rates than flighty animals.

The best time to assess temperament is post weaning, after the shock of separation from the mother has subsided. Because the trait is heritable, flighty temperament in the sire or dam is likely to indicate a flighty temperament in the calf.

Besides the effect on productivity, beef cattle with flighty temperaments pose a risk for human injury. They can be very aggressive and unpredictable, and handling these animals is difficult or dangerous. Temperament is moderately heritable, meaning that it can be improved through selection.

Examples of breeds that are recognized for their quiet temperaments are the Hereford and the Shorthorn. Breeds that tend to be more flighty include the Limousin and the Saler.

Selecting Within a Breed

It is often said that there is more variation within breeds of cattle than between breeds of cattle.

In each cattle breed, there is a large variation in milk production. Therefore you cannot pick a breed and know that your cows will produce an abundance of milk because of that selection. There may be a wide range in milk production due to the specific cows' bloodlines, etc.

There are two factors that influence the likelihood of improving a particular trait through the careful selection of breeding stock.

Heritability is the degree to which the trait is influenced by genes. For example, *calving difficulty has very low heritability, meaning that it is influenced very little by the genetic makeup of the animal. Feed efficiency, however, is highly heritable. This trait is influenced heavily by the genetic makeup of the animal.*

Selection differential is an estimate of the difference between the average of the selected animals and the herd average. The greater the selection differential, the greater the influence that breeding the selected animals will have on herd improvement.

Size, Growth and Productivity

Birth Weight: The weight of the calf at birth is dependent on the age of the dam, breed of the sire and dam, sex of the calf, length of the gestation period and other factors. Animals that are heavier at birth are expected to be heavier at weaning, assuming that all other management factors are adequately supplied. However, high birth weights can result in calving difficulty and therefore birth weights should be optimized, not maximized. Birth weight is highly heritable.

Weaning Weight: Weaning weight is a very important trait related to productivity and profitability. It is determined by the calf's genetic potential and the maternal characteristics of the dam. Fifty percent of the variation in weaning weights is due to the dam's milk production. Weaning weight is about 40-50 percent repeatable, meaning that a cow that weans a heavy calf once is likely to continue to wean heavy calves. If this trait is used as selection criteria, it is essential to adjust for differences in calf birth dates and the age of the dam.

Preweaning Average Daily Gain: This is a measure of growth rate between birth and weaning and is discussed in weight gain per day. It is affected by the same factors as weaning weight.

Post-weaning Average Daily Gain: This measures growth performance of a calf after it has been weaned. It is moderately heritable and can be selected for.

Yearling Weight: The weight of the animal at one year of age. Animals that are heavier at birth and at weaning are expected to be heavier at one year as well.

Mature Weight: Mature weight of a breed is highly heritable and the differences between breeds are significant. British breeds reach maturity more quickly than exotic breeds. This is an important growth trait that has a direct influence on the maintenance costs of the breeding herd.

Feed Conversion: The units of feed required per unit of gain. This trait shows very high correlation to growth rate (preweaning average daily gain and post-weaning average daily gain). The trait is affected by breed, weight, age and stage of production, as well as feed factors such as energy content of the diet. Selecting for good growth rate will generally improve feed conversion in a herd.

Net Feed Efficiency (NFE): Net feed efficiency can be defined as the difference between what the animal actually consumes and what it is expected to consume. NFE has been found to be moderately heritable; therefore, proper selection can result in a more efficient herd. Cattle that perform on less feed than expected are said to be more efficient and have a negative NFE because they consume less feed. This has been an area of quite considerable research.

For more information, see the accompanying *Managing a Cow-Calf Business* CD.

Cow Productivity: Defined as the weight of calves weaned or marketed per cow exposed to breeding. It can also be measured as a percentage of the weaning weight of calves to the cow's mature weight (i.e., a 600 lb. calf weaned by a 1,200 lb. cow would be 50 percent). This has been proven to be influenced by crossbreeding programs.

Age at Puberty: The age at which the animal is sexually developed to either breed or be bred. This trait exhibits medium heritability which means that it can be influenced by genetics. However, other factors that affect the age at puberty include weight and physiological age of the animal. Studies have shown that crossbreds are 3 percent younger at puberty than purebreds.

Carcass Characteristics

Carcass characteristics directly affect the grade, price and value, and the carcass grade determines the price. Following are three very important carcass characteristics that should be understood when selecting breeding animals.

Rib Eye Area: The area of the rib eye can range from 40-120 square centimetres. This trait is influenced by breed, age, nutrition and sex. It is highly heritable, and selection for animals with large rib eyes can improve the herd average.

Carcass Grade and Fat Cover: Carcasses are graded based on yield, maturity and quality. Yield, or cutability, is estimated by measuring the fat thickness over the rib eye at a predetermined point. Carcasses that are either too fat or too lean are downgraded. This can now be measured in live cattle using ultrasound technology; this is used to determine the best time to market calves. The age of the animal also affects the grade; carcasses are graded youthful, young or mature. Quality is assessed by color, texture and firmness.

Bull Traits and Sire Selection

Testicular Scrotal Development: The circumference of the scrotum is associated with the fertility of the sire and, therefore, of his progeny, both male and female. Bulls with adequate scrotal development for their age have a higher probability of becoming satisfactory breeders than bulls with below average scrotal circumference.

Ability to Breed Females: Good feet and legs, ability to mount and libido are key traits that affect a bull's ability to breed. Defects of the reproductive organs, such as spiral deviation of the penis, can affect ability to breed.

Semen Quality: This relates to the proportion of motile sperm and the morphology of the sperm. Test bulls for semen quality annually; cull those that do not meet standards. If poor fertility is a problem in a breeding herd, you need to test semen quality.

Libido: Sex drive of the bulls can be a fertility issue in a breeding herd. This trait is independent of scrotal circumference, semen quality, body weight, growth rate or masculinity. There is an observed relationship between serving capacity (the number of cows that a bull will service) and pregnancy rate.

Calving Ease: This trait is breed specific and depends on the size of the calf in relation to the size of the cow. A bull's birth weight is a good indicator of the expected birth weight of his calves. It is essential to optimize birth weights based on cow size to improve calving ease. Avoid sires that were excessively large at birth. However, easy calving bulls tend not to express as much growth in their calves. To maintain an acceptable level of growth, avoid bulls with extremely low weaning weight or yearling weight EPDs.

Key Points

It is critical to remember that although there are general characteristics associated with each cattle breed (size, milk, fertility, etc.), there are a number of factors, including selection of bulls and overall management of cattle, that will ultimately determine how the cattle perform.

Strict selection of cattle types is required no matter what breed(s) you choose to use in your operation.

Non-Genetic Factors

Genetic potential has a major influence on efficient beef production, but genetics will only take production a certain distance. Beyond that, other factors will influence the ability of the genetic potential of an animal to be realized. Managing these factors becomes key to a profitable, efficient cow-calf operation.

Some of these factors are:

- Nutrition
- Climate
- Labor availability
- Facilities.

These factors are all discussed in depth in other sections of this manual.

Managing Genetics

Expected Progeny Differences (EPDs)

EPDs have become a useful tool in selecting breeding stock for cow-calf producers. EPDs provide estimates of the genetic value of an animal as a parent. Differences in EPDs between two individual animals of the same breed predict differences in performance between their future offspring when each is mated to animals of the same average genetic merit[2]. They are calculated for birth, growth, maternal and carcass traits and are reported in the same unit of measure as the trait (normally in pounds).

EPDs can only be used directly to compare animals of the same breed. However, they can be used to compare different breeds if an adjustment is applied to account for the difference in breed.

Reported by most of the major beef breed associations, EPDs are calculated using complex statistical models that include virtually all performance data associated with a particular animal. This includes weight records on the animal itself, information from its sire and dam, grandsire, great grandsire, maternal grandsire, brothers, sisters and progeny. These records are then adjusted for factors such as the age and sex of the animal, and the age of the dam prior to inclusion in EPD databases. For progeny information, the genetic merit of the mates is also included to ensure that there is no influence on the specific animal's EPD due to superior or inferior mates; the EPD evaluates that particular animal's genetic merit and no other.

These complicated statistical models also include adjustments for the effects of factors of the production environment such as nutrition, climate, geographical location, etc. Through the use of artificial insemination, there are genetic links between herds across Canada and the U.S. Because these genetics are evaluated in different environments, it is possible to account for the effect of those different environments on the performance of progeny from those AI sires. Genetic relationships that exist between traits are also considered in EPD calculations.[3]

[2, 3] Greiner, Scott P. Understanding Expected Progeny Differences. Virginia Cooperative Extension. Publication 400-804. 2002.

Using EPDs

Following is an example set of growth and maternal EPDs. Assume that these two bulls were mated to the same set of cows.

	Birth Weight EPD	Calving Ease EPD	Weaning Weight EPD	Yearling Weight EPD	Maternal Milk EPD	Maternal W W EPD
Bull A	+5	+0	+20	+40	+15	+25
Bull B	+1	+5	+10	+20	+10	+15

Calving Ease EPDs

Calving ease EPDs predict the ease with which a bull's calves are born to first calf heifers. They are reported as deviations in percentage of unassisted births. In our example above, we could predict that Bull B will have 5 percent more unassisted births than Bull A if they were mated to the same set of heifers.

Weaning and Yearling Weight EPDs

These EPDs are indicators of the genes for growth that will be passed on. Weaning weight EPDs predict the average difference in weaning weight of a bull's progeny compared to progeny of another bull. A standard weaning age of 205 days is used for this EPD. Based on our example, we would predict that calves from Bull A will be 10 lb. heavier than calves from Bull B at 205 days old.

Yearling weight EPDs predict the average difference in a bull's progeny at 365 days of age. Based on our example above, we would predict that calves from Bull A will weigh 20 lb. more than calves from Bull B as yearlings.

Maternal Milk EPDs

Milk EPDs reflect the milking ability of a sire's daughters. It is expressed as additional pounds of calf weaned by a bull's daughters. In our example above, we would expect daughters of Bull A to wean calves that are 5 lb. heavier than calves out of daughters of Bull B. This indicates superior milk production in daughters of Bull A.

Birth Weight EPDs

In the example to the left, the difference between Bull A and Bull B is 4 lb. (5–1=4). Based on this, we would expect that a calf from Bull A will be 4 lb. heavier at birth than a calf from Bull B. Remember that EPDs are used to compare expected differences between animals; they do not tell us what the expected birth weight will be.

If you are comparing Bull A to Bull B for use on heifers, which bull would you choose?

The above EPD is important to consider when you are raising replacement females from your own herd. Remember that it is desirable to optimize milk production, not necessarily maximize it. More milk production usually means greater feed requirements for maintaining body condition and reproductive efficiency.

Maternal Weaning Weight EPDs

Also referred to as the total maternal EPD or the combined maternal EPD, this predicts the total difference in the weight of a bull's daughters' calves at weaning. A portion of this difference comes from the milking ability of his daughters, and a portion comes from the genes for growth that are passed from the bull to his daughters.

Maternal Weaning Weight is equivalent to: Milk EPD equals half the weaning weight EPD. In our example on page 13, we would predict that daughters of Bull A will wean calves that are 10 lb. heavier at weaning than daughters of Bull B.

Scrotal Circumference EPD

Scrotal circumference, expressed in centimetres, predicts the difference in scrotal size that will be passed on to progeny. This is an indicator of age at puberty; bulls with larger scrotal circumference EPDs would be expected to sire daughters that reach puberty sooner. It is also an indicator of the reproductive ability of the bull.

Gestation Length EPD

Shorter gestation lengths are associated with smaller birth weights and greater calving ease.

Stayability EPD

Stayability EPDs are indicators of the longevity of a bull's daughters (i.e., how many years they will remain in the herd and produce calves).

Carcass EPDs

With increasing emphasis on the end product that we sell to consumers, carcass EPDs have gained popularity and availability over the past few years. These EPDs are expressed at a standard slaughter age endpoint, usually around 480 days of age.

Data used for the calculation of carcass EPDs comes from slaughter steer and heifer progeny, and ultrasound scan data from yearling bull and heifer progeny. EPDs generated from slaughter data versus ultrasound data are very similar, so both can be used for selection.

	Carcass Weight EPD	Marbling EPD Fat	% Intramuscular EPD	Rib Eye Area EPD	Fat Thickness EPD	% Retail Product EPD
Bull A	+20	+0.20	+0.15	+0.50	-0.04	+0.50
Bull B	+10	+0.00	+0.00	+0.25	+0.00	-0.30

Carcass Weight EPD

This EPD predicts differences in pounds in progeny carcass weight. In our example, we would predict that calves from Bull A will have carcass weights that are 10 lb. heavier than those of calves from Bull B.

Carcass weight is an indicator of the total amount of retail product in a carcass, but not a good indicator of quality and cutability.

Marbling and Percentage Intramuscular Fat EPDs

These are measures of quality and cutability of the carcasses from a bull's progeny. Higher EPDs indicate a likelihood of a bull's progeny attaining higher grades. In our example, we would predict that Bull A would sire slaughter progeny with superior marbling scores compared to Bull B.

EPDs generated from ultrasound scan data reflect differences in chemical fat content within the rib eye muscle (intramuscular fat). Research shows a strong relationship between percent intramuscular fat and marbling score.

Rib Eye Area EPDs

Rib eye area is expressed in square inches. In our above example, we would predict that calves sired by Bull A would have rib eyes that are 0.25 square inches larger than calves sired by Bull B.

Rib eye area is closely related to retail product yield. Bulls with larger rib eye area EPDs will sire calves with more muscle.

Fat Thickness EPDs

Expressed in inches, this EPD is used to predict differences in carcass fat thickness between the 12th and 13th rib. Bull A should sire calves that have 0.04 inches less carcass fat cover compared to calves sired by Bull B, assuming a constant slaughter age of 480 days. As fat thickness increases, percentage of saleable retail product declines.

Percent Retail Product EPDs

Sires with higher PRP EPDs are expected to produce progeny with higher cutability and more desirable yield grades. In our example, we would predict that Bull A will sire calves whose carcasses will have 0.8 percent more retail product than calves sired by Bull B.

Heterosis Example

Breed A: Average weaning weight=500 lb.
Breed B: Average weaning weight=560 lb.

Therefore, the average of the crossbred calves is 530 lb.

Breed A crossed with Breed B–resulting calves have a weaning weight of 550 lb.

Heterosis = [(550–530) / 530]x100=4 percent

This 4 percent increase in weaning weight, or 20 lb. in this case, is defined as hybrid vigor.

Crossbreeding

Efficiently producing beef is a result of optimizing management (non-genetic factors) and breeding (genetic factors). The majority of beef operations in Alberta raise crossbred cows as most animals are not purebred. Research across North America has proven that crossbreeding leads to increased productivity without any added costs or inputs.[4] Breeds should be selected on the basis of size and growth, milk production, hardiness, carcass composition and availability. They should match the available resources within each farming system. The crossbreeding system chosen depends on your managerial ability, availability of breeds and crossbreeds, availability of pastures, time and labor, and the acceptance of the crossbred in the marketplace.

There are essentially two reasons why crossbreeding works.

Breed complementarity: crossbreeding provides the opportunity to mix the most desirable traits of two or more breeds. The strengths of one breed will complement the weaknesses in the other breed and result in a more productive animal.

Heterosis: hybrid vigor. Heterosis is defined as the amount by which crossbred animals exceed the average of the purebred parents used for breeding, expressed in percent.

Percentage Heterosis=[(Crossbred Average–Purebred Average)/Purebred Average] x100

The more highly heritable a particular trait, the faster that trait can be improved in your herd by selecting within it. However for traits having low heritability, response to selection is slow.

FOR EXAMPLE

Reproductive traits generally have low heritability; they respond very slowly to selection pressure since a very small percentage of the differences observed among animals is due to genetic differences.

Traits with low heritability are where crossbreeding can have the biggest impact on improving the productivity of your cow herd. Areas such as the product/carcass traits can be improved significantly through selection while crossbreeding has little or no effect.

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[4] http://www.thecattlesite.com/articles/804/crossbreeding-systems-in-beef-cattle/

Expression of heritability and heterosis in traits of economic importance in beef cattle production[5]

Trait	Heritability %	Heterosis %
Reproduction	Low (5-12)	20
Maternal	Low to Moderate (>20)	15
Growth	Moderate (20-40)	5-12
Product	High (40-50)	NIL*
*insignificant		

Producers can use the relationships between heritability and heterosis to tailor a crossbreeding program that fits their individual needs.

Crossbreeding Systems

No breed is perfect. One of the reasons that crossbreeding works, as cited above, is breed complementarity. Through crossbreeding, a commercial cow-calf operation can produce a calf that exhibits the most desirable traits of the breeds used in the cross.

Crossbreeding two British breeds (such as a Hereford/Angus cross) will result in hybrid vigor, but not to the same extent as a Continental/British cross (Simmental/Angus). Breeds from diverse genetic backgrounds will express higher levels of hybrid vigor when crossed.[6]

Remember that crossbred calves will not exceed both parents in every trait. Effective crossbreeding programs must be designed to optimize performance, not necessarily maximize it.[7]

FOR EXAMPLE

We know that British breeds grade well because of their excellent marbling. However, they do not tend to yield as much as Continental breeds because they are smaller. Continental breeds in general do not grade as well because they are much leaner; however, they yield a much more saleable product than British breeds. Therefore, crossing a British breed with a Continental breed produces a beef animal that grades well and yields a more saleable product. We also know that British breeds mature earlier; crossing a Continental and a British animal then also implies that the resulting calf will be ready for marketing earlier than a purebred Continental.

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[5] http://www.thecattlesite.com

[6] http://www.thecattlesite.com/articles/804/crossbreeding-systems-in-beef-cattle/

[7] http://www.ext.vt.edu/pubs/beef/400-805/400-805.html

Two-Breed Cross

A simple system that requires only one breeding pasture, the two-breed cross involves maintaining a herd of purebred cows of a single breed and mating them to a bull of another breed. This cross allows realization of heterosis in the calves, but heterosis is not maximized because it does not allow for the realization of maternal heterosis (the use of crossbred cows). This is a good system for a small producer to add value to the cow herd. It can also have a fit in providing replacement females for producers using more complicated crossbreeding systems.

When selecting the crossbreeding system for your operation, consider the following factors:

- Herd size–some systems require larger herds to work effectively.
- Availability of breeding pastures–do you have enough separate pastures to run different bulls with different cow herds?
- Labor and management requirements–do you have enough people on hand to manage the handling of the animals?
- Feed availability–is feed availability an issue in your geographical area?
- Production and marketing system–the selection of breeds that will be crossed must produce a calf that will complement your production and marketing system specifically around selling time, backgrounding capabilites and buyer demands.
- Availability of high quality bulls of the desired breeds–on paper, it may seem like the perfect cross, but can you get acceptable breeding stock to do it?

Crossbreeding With a Plan

For crossbreeding to be effective, the process must be planned. Uniformity of the cow herd is an important part of an efficient beef cow-calf operation. Variation in size among the breeding herd means that nutritional requirements vary among the herd, and feed will be wasted because you are feeding to meet the needs of the animals with the greatest requirements.

Think about your priorities when you are planning your crossbreeding program. Think about your production environment and your goals. For example, a producer who has an abundant feed supply and plans to sell calves at weaning may consider milk production to be the highest priority. Conversely, a producer who plans to retain calves and feed to slaughter would place less importance on milk production and more importance on weight gain after weaning. If labor availability is an issue, calving ease may be a high priority.

Remember that a balance of traits is usually best. As the number of traits considered for selection increases, the amount of progress made in each trait will decrease. Little progress will be made by a breeder who tries to select for too many traits at one time.[8]

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[8] www.extension.umn.edu/distribution/livestocksystems DI3926.html

Two-Breed Rotational Cross

Also known as the criss-cross, this is one of the most popular crossbreeding systems used in beef cattle production. In this system, two breeds are mated and the resulting female offspring are kept as replacements and mated back to one of the breeds. In following generations, females are bred to the opposite breed of their sire.

FOR EXAMPLE

Angus and Gelbvieh animals are crossed. This creates a ½ Angus, ½ Gelbvieh female. These females are then bred to Angus bulls, resulting in a ¾ Angus X ¼ Gelbvieh. These females would then be mated to Gelbvieh bulls. For their entire lives, females would be mated to the bull breed opposite their sire.

This system would only require two breeding pastures–one for each breed of sire. Cows need to be identified by breed of sire. For this system to work effectively, the breeds used must be reasonably compatible in biological type. Both breeds must be suitable as sire and dam breeds. The two breeds used in this system should be similar in mature size, and individual bulls selected to avoid large differences in birth weight, milk production and cow size/nutritional requirements from one generation to the next. Using crossbred cows increases heterosis and is an advantage of this system.

The same system can be implemented using three breeds; this further increases the heterosis advantage. However, using three breeds requires more breeding pastures and more management, and a minimum of 100 cows is required. It can also be challenging to find three breeds that are compatible in biological type. For these reasons, a three breed rotational cross is not feasible for many producers.

Terminal Sire Systems

A three-breed system can be more feasible if the third breed is added as a terminal sire. The terminal sire is a different breed than that used in the two breed rotation. In this system, approximately 50 percent of the cow herd is mated to the terminal sire with the resulting offspring all marketed. No replacement females are retained from the terminal sire matings. The other 50 percent of the cow herd operates as a two-breed rotation. All replacement females come from the two-breed rotation

This system works well for producers who want to produce calves with exceptional feeder calf potential. Terminal sire breeds should be selected for calving ease, growth rate and carcass merit. Since all the calves produced from the terminal sire will be sold, there is no need to use bulls with good maternal traits such as milk production.

Older, poorer producing cows should be mated to the terminal sire, and younger, superior cows should be kept in the two-breed rotation to keep producing good replacement heifers.

Selection emphasis for females from the two breed rotation should concentrate on maternal performance, appropriate mature size and longevity.

This system has been shown to increase pounds of calf weaned per cow by about 20 percent. It requires at least three breeding pastures (one for each of the two breeds used in the production of replacements, and one for the terminal sire). It requires more management and at least 100 cows.

Rotating Breeds of Sire

For smaller cow herds, rotating the breeds of sire every three to four years can be a feasible crossbreeding system.

Purchasing Replacement Females

Another simple system for smaller herds, and one that requires less management, is to use purchased crossbred replacement females and breed them to a third terminal sire breed. In this system, sires can be selected based on calving ease, optimum growth and carcass merits. Because replacement females are not being raised in this operation, there is no need to consider maternal traits in the bulls that are used.

Artificial Insemination

A simple way to change genetics in your operation is through the use of artificial insemination (AI). This can reduce the number of breeding pastures that are required and reduce the number of bulls required for natural service. Using AI makes a number of superior bulls available without the expense of purchasing and feeding the animal. However, for the use of AI to be effective, there must be appropriate facilities, available labor and expertise.

Matching the System to the Situation

Following, are some examples of appropriate crossbreeding systems for particular situations.

Rancher A has 50 cows and does not use artificial insemination. He works off the ranch and does not have a great deal of extra time to spend managing his cow herd. He has access to one pasture and is unable to take on more debt at this time to increase his herd or his capacity.

System: Rancher A could raise straightbred cows and rotate the breed of bull he uses every three to four years. He could also consider purchasing crossbred females and using a terminal sire.

Rancher B has 50 cows and also does not use artificial insemination. He also works off the farm and has limited access to capital. He has two pastures.

System: Rancher B could raise straightbred cows and rotate his sire breed every three to four years. Alternatively, if good crossbred replacement females are available economically, he could purchase them and mate to a terminal sire. Because Rancher B has two pastures, he may consider a two-breed rotation.

Rancher C has 100 cows and uses natural service. He does not work off the farm and has three sons who are good cattlemen. He has access to capital to make further investments in his ranch and his cow herd.

System: Rancher C could consider a three-breed rotation. He may want to use the third breed as a terminal sire on his first generation crossbred females to maximize heterosis.

Rancher D has 75 cows and has taken an AI course. He has excellent facilities and a hired man. Although he only has one pasture, he also has access to capital.

System: Rancher D can consider a two- or a three-breed rotation. Although he only has one pasture, because he knows how to artificially inseminate his cows and has adequate labor, capital and facilities, he can use AI for two of the sire breeds required for the three- breed cross.

Matching the system you use to your production environment is key to a successful crossbreeding program.

Summary

Selecting the breeding stock for your cow-calf operation requires careful planning and understanding the relationship between genetic potential and non-genetic influences. Identify your priorities in relation to your planned production environment, and select for the traits that will function best within that environment.

Example considerations to include when considering genetics:

Keeping replacement heifers

- Select for maternal traits in bull's milk, fertility and longevity
- Select for temperament
- Select for appropriate size of resulting cows
- Consider the desired type of cow
- Consider how to breed resulting cows.

Not keeping replacement heifers

- Look for growth and animal performance while monitoring birth weight and calving ease
- Buy in replacement heifers
- Build relationship with a producer with a high quality maternal herd.

Define the environment in which you will be raising the cattle. This refers to not only the climatic environment but also the management environment. The management environment primarily refers to the feeding programs you plan to use, either long season grazing or long season feeding and the calving program you intend to use. Cows that are expected to calve on the range with minimal human contact need to be selected differently than cows that will be calved in barns with high human care per animal.

Cattle grazing on extensive ranges with low productivity need to be smaller and hardier cattle with lower feed requirements to survive poorer grazing conditions.

Cattle grazing on highly productive grazing paddocks should be animals with higher performance capabilities. With sufficient feed quality and quantity, higher producing genetics will perform favorably.

Managing a Cow-Calf Business
An Essential Guide
Nutrition

Module 3: Table of Contents

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Overview

Animal nutrition refers to the basic substances and processes by which animals use nutrients needed and required for maintenance, growth, production and reproduction.[1]

Proper nutrition of the cattle herd is critical to a successful and profitable production system. Feed generally accounts for the largest input cost associated with beef cattle production; overfeeding, underfeeding or not feeding a balanced diet is costly.

Nutrition is a very complex and scientific topic, but the general concepts of nutrition can be easily learned and applied for everyday use of a cattle operation. This section outlines the aspects of nutrition that are required to operate a successful cattle operation. By knowing more about the nutritional requirements of animals, the nutrient contents of feeds and a few other key points about nutrition, you can use feeds and management skills that will improve your livestock operation.

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1. Animal Nutrition Course. Available through Alberta Agriculture and Food.

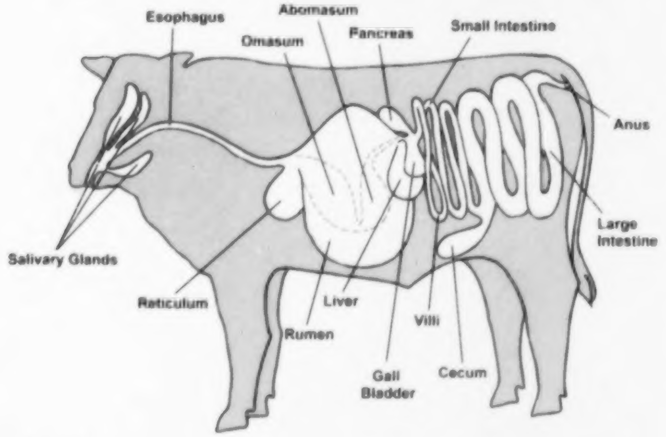
Key Terms

For a thorough list of terms and information relating to cattle nutrition, please see the following link: http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex4521?opendocument

For more information on ruminants and cattle digestion, see the *Managing a Cow-Calf Business* CD and check out these website links: http://www1.foragebeef.ca/$foragebeef/frgebeef.nsf/all/ccf60

http://www.animalrangeextension.montana.edu/LoL/Module-5b/5-Digestive2.htm

Ruminant Digestive System



Learning Objectives

The producer will:

- *Learn how to effectively manage feed requirements for a cow-calf operation*
- *Learn the basics of ration balancing*
- *Understand the different feed requirements of a cow throughout the year.*

Basic Principles of a Ruminant Digestive System

Beef cattle are classed as a "ruminants". Ruminants have a digestive system that allows them to utilize roughages such as hay and straw for a large source of their nutrients. The ruminant digestive system consists of four stomachs: the rumen, reticulum, omasum and abomasums. When feed is first consumed, it is swallowed with very little chewing, and moves into the reticulum and rumen. Cows later regurgitate boluses of forage back into the mouth where it is re-chewed and swallowed. This aids in the digestion of the feed. The rumen is a large (capacity up to 275 litres) fluid-filled organ. The rumen contains a large microbial population which handles the initial digestion of feed. These microbes have the ability to break down cellulose and hemicellulose which are the main components of roughages. At this stage, some fatty acids are absorbed into the body through the rumen walls.

The next step is for the feed and micro-organisms to move to the omasum, where further digestion occurs, and finally to the abomasum, where digestion occurs similarly to monogastrics (humans). Feeds for cattle must supply energy, protein, vitamins and minerals. An important principle that applies to all animals is the following: if all but one nutrient is fed to proper levels, that nutrient will limit performance.

First Limiting Nutrient

If a nutrient is consumed below the required level, the ability of the animal to use other nutrients is impaired. If an animal is being fed enough to gain 2 lb./day, except for one nutrient, which is only supplied at a level to gain 1 lb./day, the animal will only gain 1 lb./day and the remainder of the other nutrients may be lost. Many of these excess nutrients will be lost through the feces and urine. The worst case is for nutritional stress to be caused by excess nutrients, much the same as by nutrient deficiencies.

First limiting nutrient is a key concept in nutrition and ration management. If a nutrient is consumed below the required level, the ability of the animal to use other nutrients is impaired, and animal performance is reduced.

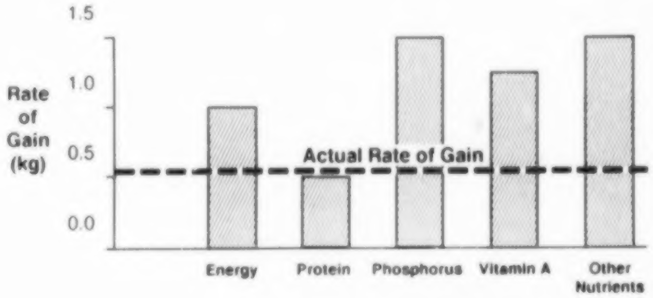
Nutrients

The proper balance of all nutrients is critical to the well being of any animal. Nutrients can be grouped according to their function in metabolism.

Energy

- Energy is the nutrient required in the greatest amount by cattle. Energy provides the body with the ability to do work. *Work* includes movement, growth, lactation, reproduction and feed digestion. In beef cattle rations, energy is generally expressed as a percentage of total digestible nutrients (%TDN). Energy is generally reported as megacalories (Mcal) per kilogram. One megacalorie is equal to one million calories.
- Energy is supplied mainly from carbohydrates in the feed. The amount of energy required by an animal will depend on its size, weight gain, milk production, weather and work. Maintenance energy is the amount of energy required by the animal to maintain its body weight.
- If energy is fed in excess, it will be stored as fat. If energy is not fed in sufficient amounts, reduced gains could result including decreased milk production and increased calving intervals. The greater the energy shortage, the more noticeable these results will be.

Example of First Limiting Nutrient



Abbreviations

Crude Protein	CP
Calcium	Ca
Phosphorous	P
Sodium	Na
Chlorine	Cl
Potassium	K
Magnesium	Mg
Sulphur	S

Protein

- Protein is one of the main building blocks of the body, and is usually measured as percentage crude protein (CP).
- It is a major component of muscles, the nervous system and connective tissues.
- Adequate protein is essential for maintenance, growth, lactation and reproduction. There are different types of digestible protein that are digested at different levels of the ruminants' digestive system.

Minerals

The major minerals in cattle nutrition are called macro-minerals and include calcium, phosphorous, sodium, chlorine, magnesium and potassium. These minerals are required in relatively high amounts compared to trace minerals, which, though equally as important as macro-minerals, are required in smaller amounts.

Calcium (Ca) and phosphorous (P) are the most abundant minerals in the animal's body, and are the most commonly added to the ruminant's ration.

- A cow's requirement will vary depending on its stage of production, but it generally requires 1.5 parts of calcium for every part of phosphorous.
- Cattle short of Ca and P often show a drop in milk production. Low levels of P in the diet may also cause poor reproductive performance.
- The Ca and P ratio is very important. It should be more than 1:1 but less than 7:1. Most minerals in free choice formulations are a 1:1 or 2:1 ratio of Ca:P.
- Animals on pasture often need supplemental P.

Sodium (Na) and Chlorine (Cl) are found together as NaCl in common salt and are required to maintain proper acidity levels in body fluid and pressure in body cells.

- Many feeds contain enough sodium and chlorine to meet the requirements of cattle; supplemental cobalt iodized (blue) salt or trace mineral salt should be available at all times.

Potassium (K) serves a similar function to sodium and is generally found in adequate amounts in forages. It may be required as a supplement in grain rations.

Magnesium (Mg) is necessary for the utilization of energy in the body and for proper bone development. Cattle that feed on lush and immature pasture may have a resulting low level of Mg in their blood, which results in a disease called *grass tetany*–characterized by convulsions, twitching and lack of balance.

Sulphur (S) is a component of body protein, some vitamins and several hormones. It is involved in protein, fat and carbohydrate metabolism, as well as blood clotting and maintenance of body fluid acidity. Most feeds have adequate amounts of S for cattle. Supplemental S may be required in certain feedlot rations.

Vitamins

Vitamins are organic compounds required in very small amounts by the body. They are essential to metabolism and some are required to be supplemented in rations for beef cattle.

Vitamins of most concern for beef cattle are vitamins A, D and E. Fresh forage is a good source for these vitamins as well as good quality preserved hay; however, in preserved hay, these vitamins decline over time. Silage contains low amounts of these vitamins because they are destroyed in the fermentation process.

- Lack of vitamin A is generally associated with poor fertility in both cows and bulls.
- Vitamin D is required for proper bone development.
- Vitamin E, along with selenium, is required for proper muscle tissue development.
- These vitamins are often administered through injections. Options do exist, such as additives for water, but proper distribution may be difficult. B vitamins are generally not a concern in cattle rations, although special situations may occur.

Trace Minerals

Feeding trace minerals can be somewhat complicated because they are required in such small amounts. A slight deficiency or excess may cause a decrease in performance which could be difficult to diagnose.

Trace minerals may also be deficient because other dietary factors may have decreased their availability to the animal.

Trace minerals include iron, zinc, copper, manganese, cobalt, iodine, molybdenum, selenium, chromium, tin, nickel and fluorine. Trace minerals can be effectively supplemented in the diets of cattle with the provision of proper trace mineral salt.

For more information on trace minerals, see the accompanying *Managing a Cow-Calf Business* CD and refer to these website links:
http:/www.agriculture.gov.sk.ca

http://www1.foragebeef.ca/$foragebeef/frgebeef.nsf/all/ccf1019

Feed Requirements

Feed requirements for proper herd management depend on several factors.

- Type of cattle
- Age of cattle
- Reproductive stage
- Weather
- Body condition
- Size of cattle.

The amount of feed required to ensure expected productivity will also depend on the quality and type of feed you have. In order to determine the composition of your feed sources, you must do a feed test.

Feed Testing

Just like other aspects of the business, it is difficult to manage what you don't measure. In order to manage your nutrition program, it is critical to measure the feed sources you have available so that any limiting nutrients in the existing feed sources can be supplemented in order to achieve optimal animal performance.

- When testing feed, it is important that the different feed sources are individually tested, and that the samples are representative of the entire quantity of feed.
- Picking the sample from the best or the worst portion will not be as helpful in managing your ration as selecting from an average sample.
- Test every year, as quality, even from the same area, will vary year to year.

For a full list of definitions and terminology regarding feed test results see the following links:

http://www.foragebeef.ca/app33/foragebeef/index_body.jsp
http://www.foragebeef.ca

Feedstuffs

Cattle can utilize a wide variety of feeds. Therefore, it is very important to understand cattle nutrition and your feed quality because there are several different rations that can be used to feed and maintain a cow. Different rations can have the same production results but significantly different costs associated with maintaining the cow herd.

Feedstuffs are broken down by different parts of the plant, either the stem and leaves (roughage) or the grain. In plants, the stem is the least nutritious part of the plant, followed by the leaves. The grain is the most nutritious since this is where most of the nutrients the plant creates through its growing cycle end up.

- Roughage is a common feedstuff for cattle, especially for mature animals.
- Depending on the growth stage when harvested, roughages are high in fibre with low to intermediate energy.
- Protein will vary widely with the different feed stuffs depending on plant species and stage of maturity. As plants become more mature, their protein level decreases.

Roughages generally fed to cattle include hay, grass, straw, silage, greenfeed and grain hulls.

Greenfeed

Greenfeed is a cereal crop which is cut before the grain is fully matured. It is baled in a dry form at 12-15 percent moisture, and the entire crop is baled, much the same as hay.

Silage

- Silage is feed which is processed and stored at a high moisture content in an air tight environment to allow for fermentation.
- Since silage has a high moisture content, it is not economical to transport over long distances; therefore, if you are looking to buy or produce silage, it should be done reasonably close to your storage area.
- Also, since silage requires anaerobic processes, sealing and storing silage is critical to the effectiveness of a silage feeding system.
- Silage can either be produced as chopped silage, packed in a pit or stored in a silo, or produced and stored as high moisture plastic-wrapped bales.
- Silage equipment is generally quite expensive to own unless you are producing a large amount of silage, but custom silage operators tend to be available in most parts of Alberta.
- One of the biggest advantages of silage is that it can be produced at a consistent quality, as it is not subject to as much weathering risk as other feed choices.

Grain and Pellets

Grain and pellets (grain screenings which are in a pellet form) can be an important part of a cow's diet or may not be used at all. The choice generally depends on your economic situation as well as your grain-feeding facilities. Since grain is a higher value product, and is fed in relatively small amounts, you should feed grain in troughs or bunks to reduce waste.

It is important to ensure that hay is baled at a proper moisture level to ensure no spoilage occurs from the hay being too wet. Proper baling also reduces the chance of mold.

- Common feed grains include barley and oats. Wheat and corn are also used but mostly at the feedlot level. Grains tend to be high in energy and low in fibre, and have a moderate protein content.

Hay/Alfalfa

Perennial forage is a very common feed source for cattle. Depending on your area, there may be one, two or three cuts of hay produced on a field per year. Each cut tends to be higher quality than the last, assuming no weathering damage occurs to the crop.

When producing or buying hay or straw, it is important to ensure that hay is baled at a proper moisture level to ensure no spoilage occurs from the hay being too wet. Proper baling reduces the chance of mold. Depending on conditions, hay should be baled with a moisture content below 16 percent.

It is also important to note that hay that has been rained on in swath will likely be of lower quality; the nutrient and vitamin levels are lower, and the palatability also tends to drop.

- Rained-on hay generally has less available protein and digestible dry matter; therefore, energy intake also drops when it is fed to cattle.

Straw

Straw in a diet may be an economical way to feed cattle. Straw can be mixed into feed rations or fed free choice as a roughage. Because straw can have varying amounts of nutritional value, it should be tested, especially if it is being used as a component in the feed ration.

Alternative Feeds

A wide variety of alternative feed sources are available. Feeds such as chaff, brewer's mash, and even distiller's grain from ethanol plants, are options for cattle producers. Given the different attributes of these products, flexibility in your feeding system is key, and feed testing to know what you are feeding is also important as the nutrient content can be highly variable.

For further information on alternative feed sources, visit http://www.foragebeef.ca

Ration Formulation and Balancing

The first step in ration balancing is understanding voluntary feed intake. This basically relates to the fact that cows cannot consume an unlimited amount of feed. Different types of feed have different levels of voluntary feed intake. In general, cattle consume 1.4 to 4 percent of their body weight daily in feed. More information on feed intake amounts are available in the Cattle Nutrition Course.

Once you have your animals' feed requirements, and your feed resources available, you can begin to put together your feed ration. Feed requirements for different animals can be found in the Cattle Nutrition Course from Alberta Agriculture and Food or through National Research Council, 2000, "Nutrient Requirements of Beef Cattle".

Also, there are ration balancing computer programs such as CowBytes which will provide the feed requirements as you specify production parameters for your cattle.

Information on CowBytes can be found at, http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/hst875

Ration formulation is critical to the success of your cattle operation. Excessive feeding can lead to economic losses from wasted feed. Insufficient feeding practices also have economic costs because they will lead to poor herd productivity. It is critical to be aware of the production stage of your cow herd in order to match the ration to the feed requirements of the cows as they transition from dry cow, through second and third trimester, to calving, then lactating and rebreeding and through lactation until weaning and re-starting the cycle as a dry cow. A cow that has just started lactating and will be required to rebreed, will have significantly higher nutritional requirements than a dry cow in the fall in order to maintain productivity.

Ration formulation is also economically beneficial; if some nutrients are in excess, producers may have an opportunity to substitute a less expensive feed stuff such as straw or chaff, and not change productivity.

Instructions on how to manually calculate ration balancing are also available in the Cattle Nutrition Course.

To summarize the ration formulation process:

- The first step is to determine which feed to use in the largest quantity, and to determine how much of this feed will be required to meet the digestible energy (DE) requirements of the animals you are feeding.
- Will the cows consume this amount of feed?
- Once you have calculated the amount of a given feed, to meet DE requirements, determine if there is sufficient protein in this feed to meet appropriate protein requirements. If there is an insufficient amount of protein supplied, protein may have to be added or the ration adjusted to meet both energy and protein requirements.
- If there is sufficient protein, the next ingredients to check are the amounts of calcium and phosphorous supplied to determine supplemental mineral requirements.
- Add the required Vitamin A, minerals and salt as needed.
- Finally make sure the ration is practical and cost-effective; if it is not, consider alternative rations.

Summer Grazing

When cattle are grazing, the forage they consume is basically their entire diet. It is recommended, though, that minerals be available during the breeding season.

The quality of pasture and forages is highly variable; as a result, animal performance is variable. Pasture forage quality will vary depending on the types of species, the stage of the grasses and the growing conditions. More discussion on this issue is included in the grazing section, but it is important to realize that the mix of grasses, and grazing grasses at a consistent stage throughout the year, can reduce the variability of cattle performance over the grazing season.

Overall macro-nutrition management is much less intensive in the summer, but it is still critical to monitor animal performance and health in case there is a limiting nutrient that may be required for supplementation.

Water Quality Management

Water is also a nutrient; it is the most important substance in nutrition. Like feed, water should be tested. Water should contain less than 7,000 parts per million (ppm) of total salts and less than 100 ppm of total nitrates. The highest level of sulphate recommended is 1000 ppm; levels higher than this may cause copper, zinc, iron or manganese deficiency. Other water contaminants may also be determined through a water test.

At birth, water makes up 75-80 percent of an animal's body weight and 54 percent at maturity (Cattle Nutrition Course).

Cattle get water by three methods:

- Drinking water or consuming snow
- From water in feeds
- From chemical processes in the digestive system.

Cattle lose water through four methods:

- Urine
- Feces
- Sweat
- The lungs as water vapor.

Throughout the year, a cow's consumption of water may range from 6 gal./day when they are dry (not lactating) on a cool day to 20 gal./day on a hot day while they are lactating.

Water consumption is linked to feed intake as well as temperature, and a drop in feed intake is the first sign of a water shortage.

Although cattle tend to be offered free access to water year round, there has been research that shows cattle perform equally as well by consuming snow during the winter. There may be a slight adjustment period as the cows make the transition from drinking water to consuming snow.

- If water is not being supplied to the cattle, it is critical that snow and cattle conditions are monitored closely.

Monitoring Cows' Nutrition

Body Condition Scoring

Body Condition Scoring (BCS) is becoming a more and more popular management tool to determine and monitor feeding programs. BCS is a hands-on, practical, simple and cost-effective way to determine the condition, or amount of fat, your cattle have.

- The BCS system rates cows on a scale of 1 (very thin) to 5 (excessively fat). (The U.S. system is 1 to 9.)
- BCS is most useful in fall heading into the winter feeding season, at calving and just prior to breeding. It will give you an idea if your cows are going to require more energy so productivity is not jeopardized or if energy consumption can be reduced for economic reasons.
- Generally cows should have a slightly higher body condition score in fall (BCS of 3 or slightly higher) heading into the winter as cows tend to be "dry" and this is the cheapest time to add condition. It is also more economical to have fatter cows in the winter, as animals then have a fat layer for insulation and will not require as much feed for maintenance when it is cold.
- At typical calving and breeding times (spring or early summer), the optimal score is 2.5. In this case, there is no excess fat, and the cows will be heading to pasture in prime growing season when it is cheaper to supply required energy through grazing.
- Body condition scores are very useful for both economic and productivity reasons to ensure that animals are not too skinny or too fat, which could lead to productivity problems.

There is a significant amount of BCS information available; some resources are listed in the reference section on the accompanying *Managing a Cow-Calf Business* CD.

Watching the Manure

Monitoring the manure that cattle are passing also gives indications of the performance of the ration, as well as stress the cows may be facing.

- Extremely "loose" or runny manure, or smaller dried manure clumps, may mean the cattle are stressed or possibly sick.
- Cattle on lush green grass may be "loose" but this is somewhat normal, given the high content of nutrients in this grass which is being passed (lost) through the digestive system.
- Dry or hard manure may mean a lack of water or insufficient protein in the feed.
- These are rules of thumb, but noting a change in dung for unknown reasons should trigger you to have a closer look at your cows, feed and water.

Managing Different Types of Cattle

Depending on the size of your operation, and the type of cattle you are feeding, there are advantages to dividing the cattle into different groups for nutritional management. It is certainly recommended that you feed calves separately from the cow herd. First, calves have to be weaned, but they also require a different ration because they are in a growing stage of their lives, and if fed with the main cow herd, they will not be able to compete for and consume the quality feed they require.

Separating the older and younger cows from the main "easier keeping" cows within your cow herd can result in feed-cost savings and better performance.

Within the cow herd, there are opportunities to separate the older and younger cows from the main "easier keeping" cows. It is hard to balance the ration within one large group of cows as you either have to over-feed part of the herd to meet the requirements of animals that require more nutrients, or under-feed when the ration is designed for "easier keeping" cows. These divided groups may result in feed-cost savings and will result in better performance from first calf heifers and older cows. Although there are benefits, producers need to be aware that there may also be extra costs in terms of time required to feed the cows or the requirement of extra facilities.

- Bulls also need to be considered when deciding on feed rations. Generally, bulls will be separated from the herd for part of the year to ensure calving season intervals are managed, but also because they have different feed requirements.
- Bull rations can be managed similar to those of cows, in that bulls going into the winter should have a body condition of approximately 3 as they are less expensive to maintain in the winter.
- Bulls going into the breeding season require more body condition because they lose weight while they are busy breeding rather than taking advantage of the abundant grass. Having bulls with an insufficient body score at the start of breeding season could have significant impacts on the following year's calving season and overall herd performance.

Feed Regulations

Feed manufacturers selling any type of feed or supplements are regulated under the *Feeds Act* by the Canadian Food Inspection Agency (CFIA).

All feeds must bear a label showing the guaranteed analysis and feeding directions, as well as any warnings. Feed regulations are always changing, and the CFIA monitors allowable additives and ingredients.

There is a wide range of restrictions on ingredients for different species. The most critical point to remember is to not mix livestock feeds. For example, if you have some protein supplements for chickens or any other species besides cattle, these must not be fed to cattle. These regulations also apply to certain medications.

Summary

Nutrition is a critical component to a successful cattle operation. Cattle lacking in proper nutrition will likely not perform properly and have a greater chance of incurring a disease which will lead to reduced income and increased costs.

Testing your feed sources and monitoring your cattle are key to proper nutrition management.

Over-feeding or under-feeding will result in poor economic performance and, possibly, poor animal performance. Cows that are too fat can also under-perform due to calving problems, poor reproduction and possible health problems.

Over-feeding one nutrient, because another nutrient is limited, is not going to improve performance and will simply increase your costs.

It is also important to be aware of the different nutritional needs of cattle at different stages of their lives, as well as at different stages of the year.

You should also pay attention to the nutritional requirements of your cattle for your system, or the type of cattle that would best fit your land base.

To increase your understanding of nutrition and ration management, it is recommended that you familiarize yourself with and build rations with the CowBytes ration management software program available through Alberta Agriculture and Food.

Reproduction

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Overview

Reproduction efficiency is critical to a profitable cow-calf operation. With the narrow margins in the cow-calf business, the success of your operation will depend on how well you manage your herd's reproduction. Poor cow fertility will lead to a younger and lighter calf crop, increased costs and poor profitability. Reproduction goals should be based on how many cows become pregnant each year, the age of those calves and how many years a cow can remain a consistent producing cow in the herd. Cows have to be managed in such a way that they can be bred within three months or less of having a calf, raise the fetus and deliver a calf approximately 286 days after being bred, in order to start the reproduction cycle over again. It is impossible to have a good producing herd (measured as pounds of calf weaned/cow exposed) if strong fertility is lacking.

Learning Objectives

The producer will:

- *Learn about the reproductive cycle of a cow*
- *Gain management strategies to achieve proper reproduction targets*
- *Understand the connection between reproduction and nutrition, genetics and economics.*

Reproduction

Reproduction efficiency involves managing your cows, heifers and bulls through appropriate nutrition, genetics, disease, herd management and animal care. Reproduction requires very dynamic management since it incorporates so many aspects of the operation to ensure healthy fertility.

Reproduction is a topic about which there is a significant amount of scientific research and information, but for the purpose of this manual, reproduction is discussed in terms of basic cattle herd management principles.

Basic Reproduction Cycle

Reproduction starts with the fertilization of the egg and ends with the birth of a calf. The cycle continues as the cow recovers from her calf's birth and prepares for the release and fertilization of the next egg.

The reproduction cycle can be broken into four definite periods:

Period	Approximate Duration
First Trimester	95 days
Second trimester	95 days
Third Trimester	95 days
Post calving period	80 days
	365 days

Therefore cows have to come into heat and rebreed within 80 days of calving in order to calve every 365 days.

- Cows have a gestation period (length of time from when the egg is fertilized until the calf is born) of approximately 286 days but can easily vary by three weeks
- Once a cow begins ovulating (releasing an egg, and coming into heat) it comes into heat every 21 days until it is bred.

For a detailed description of the reproductive anatomy and physiology of the cow, see the following link: http://extension.missouri.edu/explore/agguides/ansci/g02015.htm

Calving Season Management

Depending on your operation's production system, the amount of labor and involvement in calving may vary considerably. Cows that have been selected to breed and calve on pasture in the spring/ early summer will require less labor and calving assistance than cows that calve in the cold of winter. This is partly because cows calving on pasture have a natural selection for calving ease, sound udders and are calving in a more seasonal environment, reducing some of the risks associated with calving.

Cows calving in the winter need to be monitored more closely due to cold. The best training for monitoring cows during the calving season and dealing with calving problems comes from experience.

If possible, have an experienced neighbor to call when in doubt and trade time to help him/her with calving in order to gain experience for yourself. If serious problems occur, have your vet's phone number readily available.

Due to the high degree of monitoring required during the calving season, it is a good idea to manage the length of your calving season, as well as select cattle for calving ease and structural soundness. A critical part of the reproduction efficiency of your cattle herd is related to your bulls.

Key Points

- Be familiar with signs of calving and realize that cows can start calving nine months or less from the time the bulls were turned out.
- The first sign that cows are nearing calving is their udders begin to enlarge.
- Closer to calving, the ligaments around the cow's tail head and in the pelvic area begin to relax; as well, the vulva will begin to enlarge.

Bull Management

Bull management and selection is critical because each bull is responsible for the genetic makeup of 20 to 50 calves in a herd and contributes to your herd's reproductive efficiency. Selecting sound, healthy bulls with correct feet and legs is critical to having your cows bred in a timely manner. Also, completing a bull soundness evaluation, which includes a semen test and scrotal circumference measurement, before purchasing a bull, also ensures you are getting a sound bull that will meet your breeding requirements. A general target for most cow-calf operations is a 95 percent conception rate, with 75 percent of the bred females to calve within the first 21 days of the calving season.

Scrotal Circumference

- Scrotal circumference is an important measure, since it is directly related to the total mass of sperm producing tissue. Bulls with larger scrotums generally produce more sperm, allowing them to breed more cattle in a shorter time period.
- Each breed has standard requirements that yearling or two year old bulls must meet in terms of scrotal circumference. It is important to be aware of these standards to ensure your bull meets or exceeds them.

Yearling Bulls

- Managing a younger bull requires special considerations. Although bulls can start breeding at least two or three months after reaching puberty, it is generally preferred that a bull is 14 months old before he starts to breed.
- Condition of a young bull at the start of the season is also important. A young bull should have a body condition of no more than three to four at the start of breeding season, as additional fat will retard his ability to travel or breed. A bull should carry enough condition at the start of the season to allow for loss of body condition as he is breeding, especially in his first season.
- Young bulls are still growing and developing during their first breeding season both in body size and mass and reproductive organs. A rule of thumb for young bulls is that they are expected to breed the number of cows as they are months old.

FOR EXAMPLE

If a bull starts the breeding season at 15 months of age, he should be exposed to 15 breeding females in his first year.

Physically Sound

- As discussed earlier, bulls must be physically sound during the breeding season as injured or sick bulls are not efficient in breeding cows. It is important to evaluate and test your bulls every year, so that as many cows as possible are bred at the start of the breeding season, rather than discovering after 21 days that a significant number of cows are coming into heat for a second time.

Multiple Bulls

- From an animal perspective, the ideal is to use one bull per herd of breeding females, since having several bulls with one group of females leads to fighting and a greater chance of temporary or permanent injury.
- If you choose to run several bulls with the cows, at least run the bulls together before the breeding season so that they can establish their hierarchy and reduce the chance of injury while breeding.
- Another option when breeding females in a group too large for one bull is to rotate bulls one at a time. Rather than running two bulls for the whole season, consider turning out one bull for one week, then replacing him with another bull for the next week, followed by the first bull for the third week again.

Artificial Insemination (AI)

- Depending on your breeding program, there may be an opportunity to use AI for genetic selection and a decrease in breeding costs. You may want to AI some cows, especially when there are a significant number of cows coming into heat, rather than having to purchase an additional bull.

You can find more specific information on artificial insemination at: http://osuextra.okstate.edu/pdfs/F-3164web.pdf

Cow to Bull Ratio

- This is critical to a successful breeding season. Having cows and bulls settled and comfortable within the herd is important. Ideally, you want to avoid having to buy and care for an excessive number of bulls.
- The cows to bull ratio will vary depending on the length of calving period, cattle distribution, age of the bull, fertility of the bull and pasture conditions. A healthy mature bull can breed from 20 to 40 cows, depending on the factors mentioned.

Nutrition and Reproduction

Proper nutrition is an important consideration when a producer is trying to achieve reproduction goals. As cows and heifers move through the different stages of their reproductive cycle, their nutritional requirements change. If these nutritional requirements are not met, then poorer reproduction and performance result. This could lead to extended calving periods, lower weaning weights and, possibly, increased culling rates. Adequate nutrition and cow fertility are closely correlated.

FOR EXAMPLE

A lactating cow will require 25 percent more nutrients per day than a cow in her last third of pregnancy.

Body condition scoring is a valuable tool in assessing your cows' performance. Cows that are losing condition after calving will be less fertile and take longer to come into heat as they are not getting enough feed to maintain themselves and their calves. Also, cows that are too fat can have reproductive problems.

It is critical to review the cows' reproductive stage when rations are being developed.

Genetics and Reproduction

To this point, reproduction has mainly been discussed as management throughout the year. The reproduction efficiency of a cow herd can also be influenced by managing the next generation of the cow herd as heifers are retained for the future.

Reproduction and genetics become very interrelated, as the selection of bulls and replacement females contribute to the genetic potential of the herd. In order to achieve other desired traits such as milking ability, temperament and carcass characteristics, these cattle must be able to reproduce, allowing the animals with the desired traits to be multiplied through selection regeneration.

Heifer Replacement Cycle

- In an effective program, heifers are expected to calve within two years of birth. For this to occur, they must be bred at 15 months of age. Producers should breed the heifers slightly earlier than the main cow herd because they will require more time to recover from calving and be rebred for the following calving season. By having the heifers calve prior to the cows, you will also have more time to monitor and assist the heifers with their first calves.
- Nutrition is also important when feeding replacement and first calf heifers. They need additional nutrition to ensure they can meet their reproductive requirements of rebreeding within three months of calving. Also, having healthy and well-maintained heifers will lead to a more productive cow herd.
- Selecting the desired females to be bred may not happen all at one time, and decisions may change before the animals are actually bred or before they calve.
- Heifer selection can be done in stages. Weaning tends to provide the first opportunity for decisions to be made as to which heifers have potential to remain in the herd. It is often recommended that additional heifers be retained at weaning as not every heifer selected at weaning will prove appropriate. Some may be culled later due to poor structure or temperament; as well, some may not breed in the time frame required. Culling late or open heifers is generally recommended, as this tends to be a good selection strategy in terms of future herd fertility.

Culling Animals

Culling for fertility is a good overall strategy, as keeping animals that are late or open promotes infertile animals. Culling late or open cows is a good way to ensure that the females in the herd are the most fertile.

- If for economic reasons you decide to keep a late birthing or open cow, do not keep replacements from her.

Late or open cows are not necessarily infertile, but this may be an indication that the nutrition program is not suitable for these animals. Cows with high milk production may have difficulty re-breeding since so much of their energy is going into their milk production and their calves. If this tends to be a theme, especially in the high producing younger females, evaluate your nutritional program and adjust if necessary or adjust the milk producing expectations of future females. Inevitably the females selected must fit the feed resources you choose.

If there is an unusually high number of late or open cows, investigate the existence of possible reproduction diseases as discussed in the Herd Health section.

Breeding/Calving Season

The common theme, "You can't manage what you don't measure," applies to reproduction management as well during the first 21 days of the breeding season. Monitoring bulls and cows during the breeding season to ensure the females are coming into heat, the bull is breeding and the cows are conceiving are the basic measurements of success. It is more critical to watch your herd at the start of the breeding season, rather than being surprised by a large number of open cows and/or a spread-out calving season.

As discussed, there are several advantages to having a shorter calving season:

- More efficient use of time and labor
- Higher weaning weights
- More consistent calf crop (improved marketability).

The most rigid method for shortening your calving season is to remove the bulls from the cow herd, after they have been out breeding the cows for the desired length of calving time. The standard breeding season is 63 days for the cow herd and 42 days for the yearling heifers (63 days allows the cows to cycle 3 times).

If the current calving season is longer than the standard, and you wish to shorten the season, be aware that if you pull the bulls on these dates in the first year, you could experience a large number of open cows. Instead, shorten the breeding season over two or three years to naturally select the cows that have the fertility, while not causing a large cull rate. Economics plays an important part here, as it may be possible to replace the cull cows cheaply, thereby reducing the amount of time required to shorten your calving season.

Pregnancy Testing

Pregnancy testing is generally done about 35-45 days after breeding to determine if a cow is in calf. This allows you to manage your open and late calving cows in the fall, rather than having to wait until spring. Significant economic savings can result, since feeding open or late cows over the winter for little or no return increases costs.

Castration

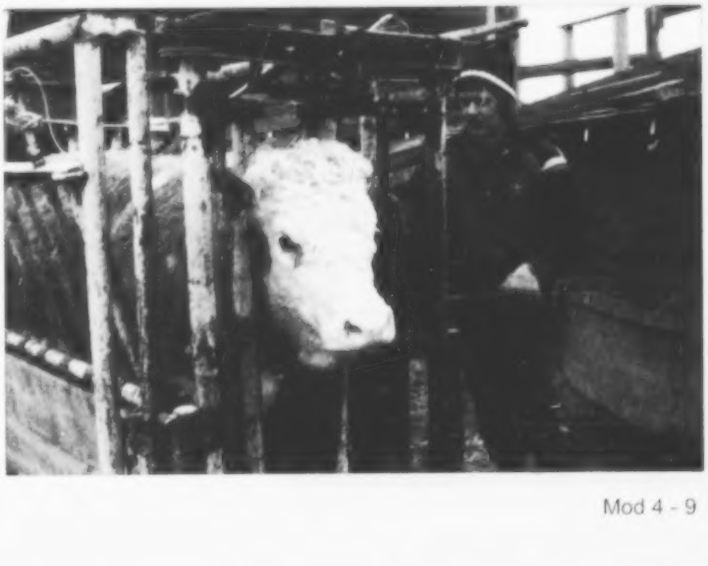
Castration of young bull calves prevents unwanted pregnancies. In earlier calving herds, calves will often reach puberty while still nursing on the cow. Heifers becoming pregnant at such an early age, and having been bred by young bull calves with unknown calving ease attributes, carry a high risk of calving difficulty and associated health complications.

For more specific information on castration techniques, see the links listed on the *Managing a Cow-Calf Business* CD.

Economics and Reproduction

As discussed throughout this section, reproductive efficiency is critical to a successful cow-calf operation. Reproduction links directly to the economics of an operation since herds with good reproduction will have older, larger and more consistent weaned calves which leads to increased revenue.

Higher reproduction rates also impact cost of production since they will lead to more pounds of calf weaned, and lower culling rates for relatively the same costs of maintaining a lower producing herd. For example, if you are feeding a herd of 100 cows, and producing 90,000 lb. of calves at weaning versus someone who is producing 85,000 lb. of calves off the same 100 cows, it is quite easy to see which operation will be more profitable, holding all other factors constant.



Summary

Reproduction is a function of genetics, nutrition, disease and herd management. Optimal reproduction is critical in order to achieve economic profitability.

To reach reproductive goals, select the fertile animals, set reproduction parameters and goals, and monitor and manage the herd accordingly.

Goals for reproduction may include:

- 90 percent females bred
- 70 percent females calved in first 21 days
- Length of breeding season:
    - *63 days for cows and 42 days for heifers*
- Pounds weaned/cow exposed
- Success of breeding new heifers
    - *95 percent bred*
    - *Average age they begin to cycle*
- Bull performance as related to above, as well as condition of bull at end of season
    - *Cows bred/bull*

Managing a Cow-Calf Business

An Essential Guide

Herd Health

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Overview

In order to ensure you have a productive herd, your animals must be healthy. Losses due to disease or pests can have a significant impact on the profitability of your cattle operation. Losses can result in death, decreased animal productivity and reduced reproduction efficiency; unhealthy animals have a lower value at sale time.

The key to a good herd health program is to be proactive and preventative rather than reactive. Once you are reacting to a sick animal, you have already lost performance from that animal, and will have to incur increased costs to doctor the animals to proper health.

This section covers herd health principles of monitoring and checking animals, as well as proper drug administration techniques.

Detail is given on common diseases and pests, and further detail on herd health is provided through the references.

Learning Objectives

The producer will:

- *Learn about common diseases and preventative measures and treatments that exist for these diseases*
- *Become familiar with common pests to cattle, as well as preventative measures and treatments that exist for these pests*
- *Learn the general timing of different types of diseases and pests*
- *Understand the general protocol for treating animals*
- *Learn the "art and science" of diagnosing and treating animals.*

Roles of the Veterinarian

When considering animal diseases, or dealing with an animal in distress, veterinarians tend to be the first people to come to mind. Knowing your local veterinarian and having a good relationship with him or her contributes to the success of your operation. Veterinarians are available to provide a wide range of information on setting up a herd health program as well as dealing with specific issues that arise with your operation.

Knowing your local veterinarian and having a good relationship with him or her contributes to the success of your operation.

When you first start out, you may rely on your veterinarian, but as time progresses and your experience builds, some of the required treatments or preventative measures will become second nature.

Veterinary/Client/Patient Relationship (VCPR)

Historical Role of the Veterinarian

- Emergency services (for example, acutely sick, downer animals, c-sections, injuries) and routine tasks were performed (for example, pregnancy examinations, breeding soundness exams, castrations, dehorning, export or AI entry testing).

- Veterinarians were not always consulted regarding animal health issues because there were outlets that sold vaccines, prescription drugs, and over-the counter (OTC) pharmaceuticals and vet supplies. These allowed producers access to drugs without the correct information regarding their use. This sometimes resulted in animals being found at slaughter with drug residues because proper withdrawal times were not followed. Food safety and consumer confidence in the beef industry became more of a concern.

Current Roles of Veterinarians and Evolution of the VCPR

- Food safety was the driving force behind the establishment of the veterinary/client/patient relationship.
- The goal was to ensure the proper use and handling of pharmaceuticals (antimicrobials) and to make sure only drug free, healthy animals entered the food chain.
- The Alberta Veterinary Medical Association, the self-regulating organization of veterinarians, drafted the following as conditions required for the prudent use of antimicrobials and a valid VCPR.

http://www.avma.ab.ca/legislation/counguid.pdf
See pages 26-28

As a producer, take a proactive approach and develop a close association with your vet who is able to provide you with a preventative type program in order to reduce emergency calls as much as possible.

Herd Health Program

The use/implementation of a herd health program will help you understand, manage and minimize the incidence of disease while at the same time maximize animal health and performance. It is important to note that the herd health program is not solely based on vaccinations and other treatments. Herd health also requires proper management of the herd in terms of proper nutrition, as well as closely monitoring the cattle to catch any problems before they become a major threat to the animal and/or the herd.

An outline of a herd health program is provided on the *Managing a Cow-Calf Business* CD including the most common considerations to include in a herd health program. Some of these steps are easily employed while others will require a professional.

Normal Health Signs

Signs of a healthy animal:

- Holds it head up
- Eyes appear bright
- Nose is clean
- Ears are up
- Stays close to the herd
- Good body condition *(eating and drinking)*
- Hair coat is shiny
- Rump area is fairly clean
- Usually will stretch when stands up.

If an animal is not showing these "normal" conditions, or just doesn't look right when you bring them in for closer inspection, check their normal vital signs:

Heart Rate:
36-60 beats per minute

Respiratory Rate:
26-40 breaths per minute

Rectal Temperature:
38.0-38.5°C or 101-102°F

If an animal's vital signs do not fall within these categories, you will have to assess the animal more closely to determine the next action.

Animal Assessment for Clinical Illness

There are a few basic things to consider when you are assessing an animal to determine whether or not it is sick:

- General appearance
- Temperature
- Environment.

General Appearance
The basic overall look of an animal is a key factor in determining the health status of the animal. Look for the following:

Appetite
This includes whether or not the animal is both eating and drinking. The first thing an animal will do when it is not feeling well is stop drinking. This is difficult to assess based on appearance. You can sometimes tell if an animal is not eating as it will often not come up to eat when feed is put out. The sides of the animal will be sunken in just behind the rib cage and, occasionally, the ribs will seem to stick out. (If the ribs are very obvious, then you know the animal has been sick for some time.) In nursing animals, you can often tell they are not eating as the dam's udder will be swollen and the teats will be dry.

Hydration Status
This is directly related to whether or not the animal is drinking. The hydration status can also be determined by looking to see if the eyes appear to be "sunken" into the head. You may also be able to tell by pulling up on some loose skin around the neck area or behind the shoulders. In a healthy animal, the skin is very elastic and quickly returns to its normal shape; in a moderately dehydrated animal, the skin takes 5-10 seconds to return to its normal shape; with severe dehydration, it may take 15-20 seconds to do the same. Very dark colored urine will also indicate the animal is not drinking enough. In large animals with mild to moderate dehydration, any manure the animal passes will be in the shape of hard dry balls; exceptions to this will be in calves with severe dehydration due to scours (diarrhea). In this case, any manure passed will be very runny and, in some cases, it will appear almost like water. With severe dehydration, the animal may also have difficulty standing.

Temperature

As a general rule, a thermometer is a very valuable tool in animal assessment. Any temperature above 39.5° C or 104° F is an indication that there is an ongoing clinical illness requiring the use of appropriate medication as outlined or described in a protocol developed in conjunction with your veterinarian. Most diseases that are due to some type of infection will cause the animal to run a fever.

There are some diseases that will not produce a fever; in some cases, the animal may have a temperature that is below the normal temperature, that is, below 38.0°C or 101°F. Milk fever is one condition that will cause a normal or below normal temperature, which seems to contradict the actual name of the condition as there is actually no fever. Hypothermia may result from another underlying condition and will cause a lower than normal temperature.

Environment and History

Sudden changes in the environmental temperature, from warm to cold or cold to warm or stormy conditions such as wind, snow and rain, even with or without proper shelter, tend to stress cattle. This stress shows up as a disease anywhere from two to seven days following a severe weather change. The transportation of animals to and from pasture, for example, can also create stress on the animals, resulting in disease. Other historical information is also very important when doing an animal assessment; where the animal came from, pre-existing conditions or previous treatments and vaccinations all provide important information on the current condition of the animal.

The overall assessment of the animal must take into consideration all of the above factors. Judging an animal based on its appearance, along with its temperature, environment and history, are all things that need to be recorded and documented to accurately diagnose an animal's condition. Once a proper diagnosis is made, record any treatments given for future reference. All of these steps are essential in producing a high quality, wholesome product.

Behavior and Clinical Signs

- Most sick animals will be alone and away from the rest of the herd.
- The animal may look depressed with its head down and droopy ears.
- The animal may stand with a humped back.
- There may be a thick yellow or greenish discharge around the eyes and nose; occasionally there will also be a similar discharge from the ears.
- The nose may also have a "crusted" appearance.
- The animal may appear to be breathing more heavily than normal; in severe cases, the animal may also be "open mouth breathing", and there may be a frothy discharge from the mouth.
- Some conditions will produce an audible noise which can range from a rattle or raspy type noise to a honking sound when the animal breathes.
- The respiratory rate of the animal can also be checked by counting the number of times the animal breathes each minute. A rate greater than 50 is usually an indication of a clinical illness.

Vaccination and Parasite Control Protocols

Although general vaccination recommendations can be outlined, you, as the producer, have certain variables unique to your beef operation that may dictate some variation from general protocols. These variations will depend on your operation's history including previous vaccination status as well as any trouble with specific disease processes. Vaccination protocols also vary between different classes of animals. The following information outlines general protocols for various types of animals. As mentioned above, the protocols may vary within each class of animals depending on the history of the herd.

Vaccination protocols are designed to protect the animal against some of the more common diseases. Develop proper and effective vaccination protocols by working closely with your veterinarian.

Vaccination protocols are designed to protect the animal against some of the more common diseases.

- Infectious Bovine Rhinotracheitis (IBR)
- Para-Influenza 3 (PI3)
- Bovine Respiratory Syncytial Virus (BRSV)
- Bovine Viral Diarrhea (BVD)
- Hemophilosis
- Pasteurellosis (*Mannheimia)*
- Vibriosis (Vibrio)
- Leptospirosis (Lepto).

Some of these diseases are covered in more detail later in this section. Other optional vaccines include vaccines for *Moraxella bovis* (pink-eye) and *Fusobacterium necrophorum* (foot rot). All of these vaccines are designed to protect the animal from a particular disease.

Only healthy, unstressed animals in good body condition (receiving adequate nutrition), should be vaccinated in order to optimize the immune response and develop long lasting protection. Animals that are stressed from over-crowding, poor nutrition, clinical illness and severe weather changes are less likely to respond well to any vaccination and, therefore, will not be protected if challenged by those things the vaccine was supposed to help prevent.

Some cattle vaccines are designed to provide protection for calves after they are born. There are a number of different vaccines, most of which provide protection against the following pathogens that can cause neonatal diarrhea (scours): *E. coli*, *Rotavirus*, *Coronavirus* and various *Clostridial* species. In this case, the cow is vaccinated; immunity is built up in the colostrum and passed onto the calf when it nurses shortly after birth. If the calf fails to nurse within the first 24 hours, it will not be protected from these pathogens and scours can result.

Since these vaccines are designed to help the dam build up immunity, which she passes on to her calf, any cows that have not calved within the first six weeks of the calving season should be given a booster vaccination to keep the immunity at a high level in the colostrum. The proper timing of these vaccinations is an important part of any vaccination protocol whether they are intended to protect the cow or the calf.

Parasite control protocols are designed to protect the animal against both internal and external parasites. Black flies, horn flies and face flies are some of the external parasites that can be controlled with the application of insecticide ear tags. These tags are usually placed in the ear (either one or two tags, with one in each ear), according to the manufacturer's specifications. in the spring prior to turning the animals out on pasture.

Parasite control protocols are designed to protect the animal against both internal and external parasites. Black flies, horn flies and face flies are some of the external parasites that can be controlled with the application of insecticide ear tags.

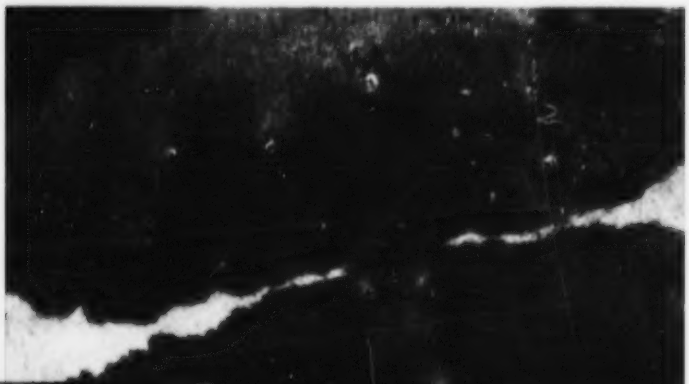
The ideal position for the ear tag is between the second and third radial cartilage while taking care not to penetrate either the radial cartilage or a blood vessel. The type of fly tag used should be alternated every two to three years to help prevent the buildup of resistance to the particular insecticides, thereby rendering them less effective. Other external parasites such as lice and ticks can be controlled by using pour-on products that contain one of the following insecticides: cyfluthrin, lambda-cyhalothrin, permethrin or rotenone. *Always read and follow the manufacturer's label directions when using these products.*

The control of both internal and external parasites such as stomach worms, warbles (see image below), lungworms, eye-worms, mange, lice, ticks and flies is easily accomplished by using broad-spectrum endectocides such as doramectin, ivermectin or moxidectin. All of these come in a form that can be applied topically as a pour-on.

When it comes to the application of insect control products, it is important to always read and follow the directions on the label and to also check the duration of action of each product. This is perhaps more critical when it comes to protection from flies as these products may not provide protection for the entire fly season.

Timing of the application is also important. Many producers use these products in the fall when the animals are brought in for pregnancy testing. Although the time of application may depend a great deal on when the producer is planning to handle the animals, the application in the spring prior to turn-out on pasture provides better protection. The parasite burden the cows are carrying will be significantly decreased; they will shed fewer eggs onto the pasture; the calves will not be exposed to a large burden of these parasites and calves will be better able to gain weight during the grazing period.

Warbles



Topical Application

Vaccination Protocol for Mature Cows and Bulls

Preferred Method

Early spring-two or three weeks prior to calving

Scour vaccination: *E. coli, Rotavirus, Coronavirus, Clostridial*

(Note: A booster may be given to cows that have not calved six weeks after the start of calving if scours have been a problem in the past.)

Spring–post calving/pre-breeding (prior to turnout)

Fly control: Use insecticide ear tags; alternate the type of fly tags used every two to three years to decrease the chance of resistance buildup.

Parasite treatment: apply a pour-on endectocide using either a doramectin, ivermectin or moxidectin based endectocide.

Vaccination-*IBR, PI3, BRSV, BVD Type I, BVD Type II (MLV)*

Add Vibrio and 5-way Lepto if in an area with foothills or the mountains or where there has been a history of those problems in the herd.

Alternate Method

Early spring–two or three weeks prior to calving

Scour vaccination: *E. coli, Rotavirus, Coronavirus, Clostridial*

(Note: A booster may be given to cows that have not calved six weeks after the start of calving if scours have been a problem in the past.)

Spring–prior to turnout

Fly control: Use insecticide ear tags; alternate the type of fly tags used every two to three years to decrease the chance of resistance buildup.

Parasite treatment: apply a pour-on endectocide using either a doramectin, ivermectin or moxidectin based endectocide.

Fall–at pregnancy check

Vaccination: *IBR, PI3, BRSV, BVD (Attenuated vaccine, not MLV)*

Add Vibrio and 5-way Lepto if in area with foothills or the mountains or where there has been a history of those problems in the herd.

Optional Vaccines

Vaccines for pink-eye and foot rot may also be added to each of the above protocols if there has been a high incidence of these two diseases within the herd; otherwise, the cost effectiveness of using these two vaccines must be closely examined.

Modified live vaccines give better and longer protection than killed or attenuated vaccines. Most modified live vaccines also carry a warning label indicating that the vaccine should not be given to pregnant cows. The concern is that doing so would cause the cow to abort. There are some newer MLVs that are safe for pregnant cows as long as the cows were vaccinated with the same MLV before the breeding season. Again, it is important to always read and follow the directions on the label.

The variation in the above protocols, for the most part, is in the timing of the vaccinations. It depends on when the cattle are normally handled; this in turn alters the type of vaccine used even though the same antigens are in each vaccine, that is, the cattle are covered for the same diseases. (With different types of vaccines, there are different levels and durations of immunity.)

Treatment Protocols

- All cattle processing and treatment drugs used should be in accordance with the protocols established with your own veterinarian. The following information should serve only as a guideline.

General Procedures

- The responsibility for producing a high quality, wholesome product for the consumer rests with every sector of the beef industry. It begins with the cow-calf producer and moves on from there to the feedlot sector; it includes the transportation of animals to the feedlots and again from the feedlots to the packing plants.

- Animal identification and scientific testing now make it possible to trace back any problems to the point of origin; any improper treatments given to calves that are even just one month of age can potentially be traced back from the packing plant to the individual producer.

Vaccination Protocol for Replacement Heifers

Spring (first year) pre-breeding

Vaccination: *IBR, PI3, BRSV, BVD Type I and II, (MLV)*

Hemophilus, Pasturella, 7 or 8 way Clostridial

Add Vibrio and 5-way Lepto if in area with foothills or the mountains or where there has been a history of those problems in the herd.

Spring–prior to turnout

Fly control: Use insecticide ear tags; alternate the type of fly tags used every two to three years to decrease the chance of resistance buildup.

Parasite treatment: apply a pour-on endectocide using either a doramectin, ivermectin or moxidectin based endectocide.

Fall (first year) at pregnancy check

Scour vaccination: *E. coli, Rotavirus, Coronavirus,*

Parasite treatment: apply a pour-on endectocide (if not done in the spring).

Early spring (second year) two or three weeks prior to calving

Scour vaccination (Booster): *E. coli, Rotavirus, Coronavirus, Clostridial*

(Note: A booster may be given to heifers that have not calved six weeks after the start of calving if scours are a problem or have been a problem in the past.)

Spring (second year)-post calving/pre-breeding (prior to turnout)

Vaccination: *IBR, PI3, BRSV, BVD Type I, BVD Type II (MLV)*

Add Vibrio and 5-way Lepto if in area with foothills or the mountains or where there has been a history of those problems in the herd.

Spring–prior to turnout

Fly control: Use insecticide ear tags; alternate the type of fly tags used every two to three years to decrease the chance of resistance buildup.

Parasite treatment: Apply a pour-on endectocide using either a doramectin, ivermectin or moxidectin based endectocide.

Subcutaneous Injection

Vaccination Protocol for Calves

Spring (at least one month of age)
Vaccination: *IBR, PI3, BRSV, BVD Type I and II, (MLV)*
Hemophilus, Mannheimia, 7 or 8 way Clostridial
Fall (two or three weeks prior to weaning)
Vaccination: *IBR, PI3, BRSV, BVD Type I and II, (MLV)*
Hemophilus, Mannheimia, 7 or 8 way Clostridial
Post weaning (80-90 days after last vaccination)
Vaccination: *IBR, PI3, BRSV, BVD Type I and II, (MLV)*

Prior to processing or treating:

- Clean and check all equipment (syringes, implant guns, disinfectant trays, chute, etc.) to ensure everything isfunctioning.
- Use the following needle sizes:
  Intramuscular (IM) injections: use 16 or 18 gauge by 1 inch or 1½ inch needles depending on the size of the animal.
  Subcutaneous (SQ) (under the skin) injections: use 16 or 18 gauge by ¾ inch needles.
  IV injections: use 14, 16 or 18 gauge by 1 inch or 1½ inch needles depending on the size of the animal and the product being injected.
  Or follow directions as outlined by your veterinarian.
- Give all injections, whether subcutaneous (SQ) or intramuscular (IM), in the neck area, above the jugular vein and below the crest of the neck. Avoid the back end of the animal where the higher priced cuts of meat are. If the label gives a choice to administer the product either IM or SQ, always choose the SQ route for the injection.

Intramuscular Injection

Key Points

- Most MLVs carry a warning label indicating that the vaccine should not be given to calves nursing pregnant cows. There is a very low risk of the pregnant cow aborting. It has never been documented that giving a MLV to a calf nursing a pregnant cow has caused the cow to abort. MLVs give better and longer protection, but you must use them at your own risk.

- The risk is greatly minimized if the mother cows are on an MLV vaccine program before any nursing calves are vaccinated with an MLV. Cows that have been vaccinated with the newer MLVs prior to breeding, and again while pregnant, will obviously not be affected in any way by calves that are vaccinated with a MLV.

Animal Diseases

There are a large number of diseases that an animal in your herd could contract. The following is a list of diseases, with the most common varieties outlined more fully in the text body.

Infectious Diseases

- Abortion
- Anthrax
- Blackleg
- BRSV
- BVD
- Calf diphtheria
- Coccidiosis
- Foot rot
- Hemophilosis
- IBR
- Johne's Disease
- Lump jaw
- Mastitis
- Metritis
- Navel ill
- Neonatal calf scours: (*Coronavirus, Rotavirus, E. coli*)
- Pink-eye
- Salmonella
- Shipping fever
- Wooden tongue.

- Give SQ injections using either the single handed or the two handed, skin tent method. With the single handed technique, the syringe is held in one hand so that it is almost parallel to the neck of the animal and the needle is inserted under the skin and then drawn back slightly to ensure it has not penetrated a muscle; the medication is then administered. The two handed technique involves pulling the loose skin over the neck area up away from the animal so as to create a "skin tent". The other hand holds the syringe and then places the needle at the base of the tent, again with the syringe almost parallel to the neck of the animal. Push the needle through the skin at the base of the tent; the medication is then administered.
- Take the time to handle animals carefully; proper animal restraint is a critical part of proper animal treatment. Improper restraint could result in injury to either the operator or the animal being treated. Improper restraint can also lead to bruising which in turn causes economic loss.
- Never mix two different medications of any kind (vaccines, antibiotics or ancillary medications) in the same syringe; consider using disposable syringes for most pharmaceuticals other than vaccines. Always use a transfer needle when mixing modified live vaccines (MLV) so that excess amounts of air do not get inside the bottle of vaccine; too much air can cause excess foaming of the vaccine. Always use a clean needle when drawing any medication out of a bottle.
- Always read and follow label directions. When vaccinating animals with MLV, only mix enough vaccine to last for one hour. Try to keep all vaccine bottles, whether MLV or killed vaccines, and syringes in a cool place; do not leave in direct sunlight. Keep all medications at the proper temperature as directed on the label.
- Never give more than 10 cc of a medication in one site; for example, if the treatment required calls for 40 cc of a particular product, give 10 cc in four different sites with the sites at least two inches apart.

- Keep an accurate record of all medications given to an animal. An individual animal record should properly identify the animal; record and show the location and method of administration for the medication (some products are given via injection, while others may be given orally, intranasally or topically). If a medication is given via an injection, record the type of injection (IM, IV or SQ); record the amount of medication given along with the drug identification number (DIN #), who gave the medication, and finally the withdrawal time of the medication (each drug has a withdrawal time listed on the label showing the time that must elapse before the animal can be slaughtered).

  Computerized record keeping is an option. There are a number of different software programs available; the University of Nebraska at Lincoln offers the following program: http://www.cowcalf.com

- Extra-label or off-label (the drug is used contrary to the label directions) use of any medication should never be done without a prescription from a veterinarian. The withdrawal time of any off-label drug use will be considerably longer than the time listed on the label.
- When treating an animal, if there is no improvement in its condition after 48 to 72 hours, consider changing to a different antibiotic, adding other supportive therapies such as anti inflammatory, pain-killer and IV or oral fluids. If the animal has been treated consecutively with three or more different antibiotics for the same condition, and there has been no improvement, it is time to stop treatments.
- Use only sharp needles. If the needle becomes burred or bent, from hitting the chute or another object, replace the needle. A damaged needle will tear the tissue, cause more tissue scarring at the injection site and possibly result in improper absorption of the medication. When processing cattle, replace the needles every 10 to 15 animals or sooner if required; consider using disposable aluminum needles rather than the steel needles.

Non-infectious Diseases

- Abortion
- Acute bovine pulmonary emphysema
- Bloat
- Cancer eye
- Cryptorchidism
- Dystocia–difficulty in calving
- Grass tetany
- Hardware disease
- Nitrate toxicity
- Overload
- Plant poisoning
- Retained placenta
- Sandcracks
- Trauma
- Uterine prolapse
- Urolithiasis
- Vaginal prolapse.

Internal and External Parasites

- Lice
- Warbles
- Mange
- Stomach worms
- Eye worms
- Lungworms
- Horn flies
- Biting flies.

Reportable Diseases

These diseases are outlined in the *Health of Animals Act* and Regulations, Canadian Food Inspection Agency (CFIA) (http://laws.justice.gc.ca./en/H-3.3/fulltoc.html) and are usually of significant importance to human or animal health or to the Canadian economy.

Animal owners, veterinarians and laboratories are required to immediately report the presence of an animal that is contaminated or suspected of being contaminated with one of these diseases to a CFIA district veterinarian. Control or eradication measures will be applied immediately.

- Anaplasmosis
- Anthrax
- Bluetongue
- BSE
- Brucellosis
- Contagious bovine pleuropneumonia
- Cysticercosis
- Foot and mouth disease
- Peste des petits ruminants
- Pseudorabies (Aujesky's disease)
- Rabies
- Rift valley fever
- Rinderpest.

- Whether treating or vaccinating animals, once the process is completed, syringes, implant guns, etc., should be cleaned by submersing in boiling water. Use a mild disinfectant to wash out syringes used to administer antibiotics or killed vaccines. Never use disinfectants to clean syringes used for administering MLV as this may destroy the effectiveness of the vaccine. Never use a disinfectant to keep the needle tip clean when using MLV as this may also render the vaccine ineffective.
- Broken needles: If a needle breaks off inside the animal during processing or treating, where possible, immediately remove the broken needle. If you are unable to remove the broken needle, identify the animal with a visual, numbered tag and enter on the animal's record a treatment indicating the animal has a broken needle; indicate the location of the needle in the comments area, and keep the animal in a hospital pen. If appropriate slaughter arrangements cannot be made, the animal should be euthanized.

Animal Disease Details

There are a significant number of diseases that exist in cattle, and a significant number of them will infect your herd at some time or another.

Only the most common diseases are discussed here, but for further information and more specific information on diseases, see the reference section on the *Managing a Cow-Calf Business* CD.

Bovine Respiratory Disease (BRD)
The term BRD is used generally to describe and encompass a number of specific respiratory diseases. Respiratory disease accounts for the highest percentage of disease in cattle which, in turn, results in the greatest economic loss.

Infectious Bovine Rhinotracheitis (IBR)
IBR is a viral infection of the upper respiratory tract. The animal can carry the virus without showing any signs of illness; when stressed, the virus begins to replicate and the animal develops a clinical illness. The virus is transmitted in secretions from the nasal passages and can easily spread from one animal to another. It causes damage to the nasal passages and the trachea (windpipe). Numerous red erosions (inflammation) can be seen inside the nostril, which is why IBR is some times referred to as "red nose"; there is often a discharge as well. Occasionally there will be a discharge from the eyes too. Squeezing the windpipe usually results in a rattle type cough. The animal is usually depressed and has a fever. IBR can lead to secondary bacterial infections that can cause pneumonia; it can also cause a pregnant animal to abort.

Shipping Fever
Shipping fever is a bacterial type of pneumonia caused by the bacteria, *Mannheimia hemolytica*. Like IBR, most animals carry the bacteria; when the animal is weaned and shipped to the auction mart, stress lowers the immunity level and allows the bacteria to proliferate, move down into the lungs and cause pneumonia; hence the term shipping fever. The bacteria are transmitted to other animals through coughing or nasal secretions. The affected animal will show some or all of the following symptoms: nasal discharge, depression, droopy head and ears, high fever, off feed, very gaunt, rapid breathing (sometimes with a foamy discharge from the mouth), and occasionally diarrhea.

While IBR and shipping fever most commonly occur in the fall, since any stress will trigger either of these diseases, they can potentially be seen at any time of the year.

Zoonotic Diseases

Any disease and/or infection which is naturally "transmissible from vertebrate animals to man" is classified as a zoonosis according to the Pan American Health Organization publication "Zoonoses and communicable diseases common to man and animals". Over 200 Zoonoses have been described and they have been known for many centuries. They involve all types of agents: bacteria, parasites, viruses and unconventional agents.

World Health Organization
http://www.who.int/zoonoses/en/

- Anthrax
- Brucellosis
- BSE
- Campylobacteriosis
- Cysticercosis
- *E. coli*
- Leptospirosis
- Rabies
- Ringworm.

Note: even though IBR is caused by a virus, antibiotics are still used to cover secondary bacterial infections. Consider keeping the animal in a "hospital" pen to monitor for improvement and any possible follow-up treatments.

Before treating animals for either IBR or shipping fever, it is important to identify and assess the animal as outlined in the animal assessment section. Check the animal's record to see if the animal has been treated previously for this same or any other condition. Score the animal for sickness on a scale from 1 to 5 and note the score in the comment section of the animal's treatment record. Also record the temperature of the animal. Based on the animal assessment, administer the appropriate antibiotic and anti-inflammatory as outlined by your veterinarian.

Atypical Interstitial Pneumonia (AIP)

There are basically two types of AIP. One is found in young animals on feed; the other is found in cows on pasture. This latter form is commonly referred to as "fog fever". There are a number of things that will trigger the disease in young animals, many of which are not well known. AIP has often been associated with dry, dusty conditions in the summer and with the spreading of straw for bedding in the winter. The animals usually do not run much of a fever. The most common finding is respiratory distress; any discharge from the nose is usually clear or a bit foamy.

The fog fever form occurs when cows are moved from an old pasture that has been well grazed to a new lush, fast growing pasture. This causes fluid to build up in the lungs resulting in similar signs as noted with younger animals. If these animals are moved too fast, they may drop dead. These animals do not respond well to treatment; it is often best to salvage the animal if possible, so do not give any drugs if the animal is in good body condition and can be sold. If slaughter is not an option, give both an antibiotic and anti-inflammatory with zero withdrawal times.

Cow with pneumonia

Honker Syndrome

Honker syndrome results from the lining of the windpipe filling with fluid. The cause is not known and it is not considered to be infectious. Although it occurs year round, it is most common in the summer. The diagnosis is made when the animal breathes and literally makes a honking sound. With heavy or mature cattle, salvage if possible; therefore, do not give any drugs. Also be very careful when trying to move these animals as they may suddenly drop dead. For light or younger cattle, give an antibiotic and anti-inflammatory as outlined by your veterinarian.

Digestive Diseases

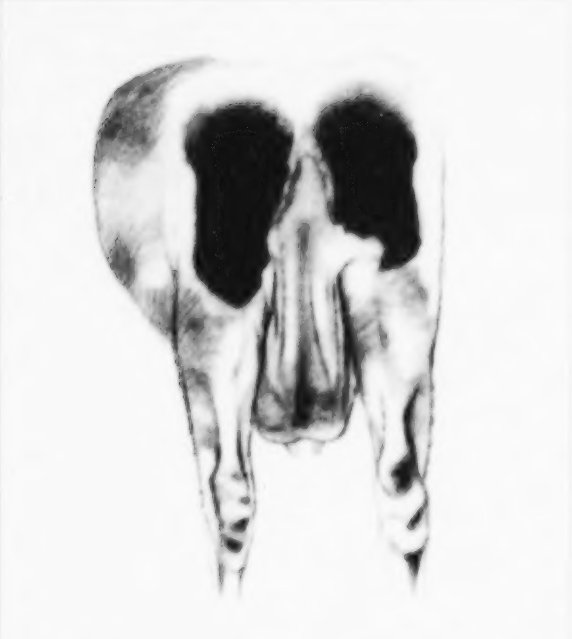
Overload results from the ingestion of too much grain in a short period of time. A good history will often lead to a diagnosis of this problem; for example, the door to a grain bin may have been left open, someone spilled some grain in the stubble field and forgot to clean it up (when the cows are turned onto the stubble field they seem to immediately find the grain) or a mistake was made when adding grain to the feed mixer. These animals will stagger around as though they are drunk, they may appear to be very full, some will have profuse, watery diarrhea, and in severe cases, they will be down and unable to get up.

It is important to identify the cause of the overload and either remove the cause or move the animals away from the cause. Give a laxative, either bolus or powder, depending on the severity of the case; remove access to water for 24 hours and provide as much long-stem forage as possible to eat. Sometimes, giving baking soda orally will help counter the effects. If a heavy or mature animal is down, consider salvage if possible.

Bloat

Bloat is due to gas buildup in the rumen due to fermentation. It can either be a gas mixed with rumen contents to create a foamy bloat, or it can be a free gas bloat. The excess fermentation may be due to the type of forage fed or the type of pasture. A pasture with lots of alfalfa will trigger bloat. An excessive amount of finely chopped grain may also result in bloat. The left side of the animal's abdomen, where the rumen is located, may appear very exaggerated and is the most obvious sign. Looking at the animal from the back, it will have a kind of pear shape with the left side sticking up above the back and the right side sticking out and down. In severe cases, the animal may go into respiratory arrest due to the pressure put on the diaphragm from the distended rumen; often you may hear a low, grunting sound as the animal struggles to breath. In mature, heavy cattle, pass a stomach tube and administer mineral oil and any type of surfactant; often, free gas (methane) will escape just after passing the stomach tube which instantly relieves the bloat condition (do not smoke when passing the stomach tube as the methane is flammable). For cattle on pasture, boluses containing monensin sodium will aid in the prevention of bloat. Consider salvaging if the animal bloats frequently. For younger cattle, use the same treatment outlined above.

Bloat



Coccidiosis

Coccidiosis is caused by a parasite. It is spread from one animal to the other via the fecal oral route. The animal becomes infected by ingesting the eggs when grazing or eating off the ground. The eggs move into the intestines and multiply causing inflammation of the lining of the intestine; more eggs are then sent into the environment which infects other animals. With severe infections, the animal will stop eating and have profuse, bloody diarrhea. The diagnosis can be confirmed with a simple test of fecal material. Medicated feed will often resolve this condition as it often involves a number of animals. For individual animals, oral boluses or an injection with drugs containing monensin or any type of sulpha drug is usually effective. Treatment of animals while still on pasture can be difficult.

Neonatal Calf Diarrhea (Scours)

Scours is caused by bacteria or viruses. In the first seven to ten days of age, the cause is usually bacterial; after that, viruses usually play a key role in the cause of scours. If the calf does not absorb colostrum from its mother within the first six to eight hours after birth, it will be predisposed to developing scours. Cold wet weather, lack of good nutrition and poor shelter may also contribute. Profuse diarrhea, dehydration, depression, weakness in walking or the inability to stand are all classical signs of scours. The most critical part of treatment is adequate fluid therapy. If the calf is still able to stand and nurse the cow, oral electrolytes that do not interfere with milk digestion are essential. Anywhere from 2 to 6 liters per day should keep the calf hydrated, depending on how severe the fluid loss is from the diarrhea. If a calf is laying down in the normal position or lying on the stomach, oral fluids may still keep the calf hydrated. When a calf is laying "flat out", call the vet so the calf can be hooked up on IV fluids.

Prevention is the best approach to take in managing scours; make sure the cows have been given a scour vaccine, but remember that this will only be effective if the calf is able to get colostrum early, within the first four to six hours after birth.

The use of antibiotics to treat scours is controversial; scours within the first seven to ten days of age are often caused by bacteria. In this case, antibiotic therapy seems indicated. Calves older than two weeks of age that have scours usually have a viral infection. In this case, the use of antibiotics is questionable. Supportive therapy from injections with drugs such as ketoprofen, flunixin meglumine, isoflupredone acetate, flumethasone and dexamethasone are often very helpful in treating scours and helping calves recover quickly.

Prevention is the best approach to take in managing scours. Make sure the cows have been given a scour vaccine, but remember that this will only be effective if the calf is able to get colostrum early or within the first four to six hours after birth. Provide good bedding and shelter facilities. Spread things out so that cows are moved into a calving area within a few days of calving. After calving, move the pairs out to a clean pasture area where they can spread out to minimize the buildup of the bacteria and viruses.

Proper vaccination is the best way to control and prevent BVD. If you suspect BVD in your herd, it is important to call your veterinarian as soon as possible.

Bovine Viral Diarrhea (BVD)

Bovine viral diarrhea as the name suggests is caused by a virus. It is highly contagious and can spread rapidly through the herd. Animals will often have severe diarrhea, a high temperature and depression, and will often not be eating. There may also be lesions in the mouth and on the gums and around the hooves. It can also cause abortion, stillborn calves, birth of weak calves and immuno-suppression which can lead to other things like pneumonia. Proper vaccination is the best way to control and prevent this disease. If you suspect BVD in your herd, it is important to call your veterinarian as soon as possible.

Reproductive and Urinary Diseases

Trichomoniasis

One type of reproductive disease is trichomoniasis. This is a venereal type disease in that the transmission occurs only through sexual contact, usually passing from the bull to the cow, causing infection in the uterus, resulting in the early death of the calf. Cows infected with trichomoniasis may have a thick white discharge that may last for one to two months. Repeat breeders in the herd is the most common sign. There may also be a high percentage of open cows in the fall when they are checked for pregnancy. There are no effective drugs for treatment. It is especially important to be aware of this disease when introducing bulls and cows from different herds. If one animal has trichomoniasis, it can spread quite quickly through the herd. The best way to control trichomoniasis is to test the bulls and cows and cull any infected animals. It is also a good practice to buy only virgin bulls and heifers to use as replacements. Do not introduce open cows to your herd, especially during breeding season.

Dystocia–Difficulty Calving

There are many different problems that can occur during calving. It is important when assisting a cow during the calving process to always use clean chains or straps, a mild disinfectant to clean off the vaginal area, and clean obstetrical gloves to protect both you and the cow from infection. Lubrication with a cellulose based lubricant may significantly help the calving process.

Uterine Inertia, Cervical Dilation Failure and Uterine Torsion

If the cow has been in the first stage of labor for more than two hours with the membranes (waterbag) hanging out, but there is no progression to active labor, the cow may have what is called uterine inertia. Often the cervix is dilated but the calf is not pushed up into the pelvic canal.

Also, if you check and find that either the cervix is not dilated or that it is only dilated a small amount, it could also be that either the cervix failed to dilate or the uterus has twisted; in any of these cases, call your veterinarian.

Normal Presentation, Backwards Presentation

If the cow is in active labor and the feet are sticking out in a normal position, but it has been more than two hours without any further progress, you may need to pull the calf.

Place two loops of the chain or straps around the feet with one loop above and one loop below the joint. If you can pull both shoulders of the calf into the pelvic canal by hand, and the head is also engaged in the birth canal, you should be able to pull the calf either by hand or with the assistance of a calf puller. If the feet seem to be upside down and you cannot find a head but are able to pull the feet out far enough to be able to reach in and feel a tail, the calf is then obviously backwards. You still may be able to pull it either by hand or with the assistance of the calf puller. It is very important when pulling the calf out that the calf come straight out and not be pulled down toward the ground as this could cause the calf's ribs to break; it may also tear the uterus of the cow.

Leg Back, Head Back, Large Calf

If you can only find one leg and the head, often it is just a matter of reaching in to find the other leg and pulling it out. If there are two legs and no head, often you can reach in and find the head has fallen back along one side; occasionally you may be able to reach in and straighten the head and then pull the calf. Often, however, when one of these conditions occurs, it is because of a fetal/maternal disproportion, that is, the calf is too big; in this case, call your vet.

Miscellaneous

Bovine Spongiform Encephalopathy (BSE) is thought to be caused by prion formation, mainly in the central nervous system. The origin and transmission is not well understood; it is thought to be transmitted by feeding rendered animal products. Affected animals appear weak, uncoordinated and listless, or they may be downer animals. Laboratory testing is required to confirm the diagnosis; any affected animals must be kept completely out of the food chain of both humans and other animals.

A feed ban was put in place by the government in 1997 to prevent further transmission of this disease. It is thought that human consumption of affected tissues may cause a similar condition in humans, called variant Cruetzfeldt-Jakob disease. BSE is a reportable disease in Canada; if you suspect an animal has BSE, you must report it to the Canadian Food Inspection Agency (CFIA).

More information on the cause, description and treatment of many bovine diseases, proper use of drugs, and other animal health related issues can be found on one or more of the websites provided in the reference section of the *Managing a Cow-Calf Business* CD.

Hiplock

If you are able to pull the calf half way out and then it stops, you may have a problem with hiplock. Often the calf will be far enough out that you can stimulate it by cleaning its mouth and nose and it will begin to breathe. Immediately call your vet. While waiting for the vet, try using large amounts of lubricant and twisting the calf. If the cow is standing, try getting her down on her side, then using the calf puller, tighten the breech strap as much as possible, then pull the calf puller down underneath the cow's belly so the calf puller is pointing towards the head of the cow. This should only be done if you feel you have enough experience and know what you are doing.

Twins

If you check and find there are four legs coming out, try to isolate which pair of legs belong to which head or tail; often there will be twins. Once you have isolated one calf, push the other one forward while pulling the other one out. If you are unable to make any progress within 30 minutes, call your vet.

Breech Presentation

Occasionally you may reach in and find just a tail and no legs; this is a breech presentation. Call your vet. Anytime you have spent a prolonged time assisting a cow, administer a broad spectrum, long-acting antibiotic. Do the same whenever you assist a cow and the calf comes out dead.

Retained Placenta

This occurs when the cow does not pass the placenta after calving. It has been linked to deficient amounts of selenium in the diet and cows that have been induced with drugs to give birth. The diagnosis is based on visualization of the membranes (placenta) hanging down from the vagina after calving. For treatment, give 5 cc of oxytocin (IM) within the first 24 hours after calving. If more than 24 hours after calving, give two injections of prostaglandin, 2 cc IM and oxytocin 5 cc IM, 24 hours apart. If the cow is off feed or looking sick, give a long acting antibiotic every 72 hours as needed. Also infuse 50 cc of tetracycline into the uterus. Gentle traction of the placenta may help, but if the placenta does not readily come, leave the cow and give the drugs more time to work.

If the animal looks very sick, use a stronger antibiotic daily for four to five days, along with the infusion of the uterus with tetracycline as outlined above. If, on the other hand, the cow is in good health, leave the placenta hanging. Eventually the natural processes of disconnection will take place and the placenta will drop out.

Musculoskeletal

Blackleg is caused by a "soil borne" bacterial (*Clostridial*) infection. In many cases, the animal will be found dead without having shown any clinical signs. It occurs most often on farms where there have been recent excavations. The bacteria enter the animal through the digestive tract or a wound. Animals that are found dead will often have a large muscle area that is swollen and cold, and feels spongy. Proper vaccination of the herd helps prevent this disease.

Foot rot is caused by bacteria. It occurs most commonly in periods of wet weather, although it may occur at anytime during the year. The most obvious sign is lameness in one leg; the bottom part of the leg will also be swollen, along with swelling between the hoofs. If a large number of animals are affected, use feed medicated with tetracycline. If just a few animals are affected, inject a long-acting tetracycline. Occasionally the use of an anti-inflammatory speeds the recovery process. If treating a mature bull for foot rot during the breeding season, the use of an anti-inflammatory may affect sperm production.

Key Points

When moving through your cattle, always be aware of animals that may be displaying unusual characteristics, and have a closer look at them.

Do you know what to be aware of in an animal that may be sick? Do you know what the normal health parameters are for cattle?

- Do they look dopey?
- Are they separate from the herd?
- Are their eyes sunk in?
- Do they stretch when they stand up?
- Have they been eating?
- Have they been drinking?
- What is their history?

Vaccination and Treatment Protocols:

- Read and understand all directions before use.
- Does the recommended treatment get administered IM, SQ, topical or IV?
- What is the best timing for use?
- Remember, best results from vaccinations occur when vaccinating healthy animals.
- Are you comfortable with treatment protocols?
- Never use any drugs "off-label".
- Keep accurate records for herd treatments as well as individual animals.
- Make sure all equipment is cleaned properly and in good working condition.

Key Points

Parasite Control

- Do you have a plan?
- Does your control method protect against internal and external parasites?
- Are you familiar with the most common diseases? Are you aware of their symptoms?
- Do you know how to go through a proper animal assessment?
- Do you know which diseases are reportable?
- Are you familiar with common calving problems?
- Do you have a contingency plan in case of problems with a calving?

Summary

As you have seen there is a large amount of knowledge required to manage your herd's health program. Time is required to learn the different elements of diseases, diagnosis and treatments, but with experience comes wisdom. Learning from others as well as having a good relationship with your veterinarian is key. There are also complete manuals available dedicated solely to herd health. These may be of great use especially if this is a new endeavor.

The most important part of herd health is the planning, and to be proactive and take preventative measures. This results in a significant amount of time and money saved from reacting to herd health problems, as well as losses due to poor animal performance. Once your herd health program has been established, you will still have to be sure to use the best animal care management in order to have an effective herd health management program. It is also wise to revisit your herd health program at least semi-annually, as conditions may change. Even though you have these systems in place, it is still critical to monitor your herd to ensure the animals are healthy.

At least twice a year (generally in spring and fall), review your herd health plan with your veterinarian for proactive planning. You may also need a veterinarian, in reactive situations, when sudden and unexplained problems occur. If you are unfamiliar with handling, diagnosing and treating animals, work hard at developing these skills either through learning material or build experience working with an experienced neighbor or friend. There is an "art" and "science" involved in having good "cow sense" when it comes to the proper handling and treatment of animals. Know your limitations, and know when it is time to call for help in an emergency situation.

Management

Managing a Cow-Calf Business

An Essential Guide

Grazing Management

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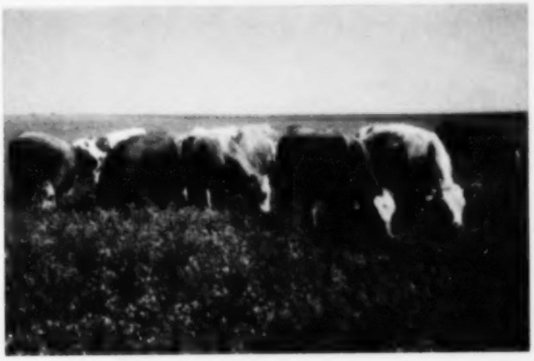
Overview

It is often said that the cheapest way to feed a cow is have her gather the feed herself. This saying suggests that there is tremendous opportunity to improve the economic performance of your operation through well managed grazing systems. Grazing management involves managing forages and livestock to have optimal forage production and to achieve optimum cattle performance from your pastures over the long term. This section discusses a wide variety of grazing options available to feed your cattle herd.



Learning Objectives

The producer will:

- *Learn the importance of a sound grazing system that will extend the grazing season*
- *Learn how to develop an economical grazing system*
- *Gain strategies to improve the productivity of the pasture.*

Grazing Management

A grazing system of turning cattle out to pasture in the spring and gathering them up in the fall was long ago proven to be inefficient. Under continuous grazing, cattle travel around the entire pasture and have full selection of all types of forages at any time they want.

Cattle will eat the forage that is the most palatable and easiest to access. This is harmful to your pasture's productivity since some plants are grazed too frequently and others not grazed frequently enough.

In order to achieve more efficient use of your pasture, develop a grazing strategy. Grazing management should be based on the type of forage being grazed, the animal requirements, land productivity and return on investment in the land, pasture development costs and infrastructure costs.

The first place to start when building a grazing plan is to do a condition score on your pasture. If it is an unhealthy pasture, it may need rejuvenation in order to be productive. If pasture has been over grazed or under grazed, different management strategies are required. These varying strategies are discussed in this section.

For more information on pasture condition scoring, see: http://www1.foragebeef.ca/$foragebeef/frgebeef.nsf/all/frg113

Plant Recovery and Species Succession

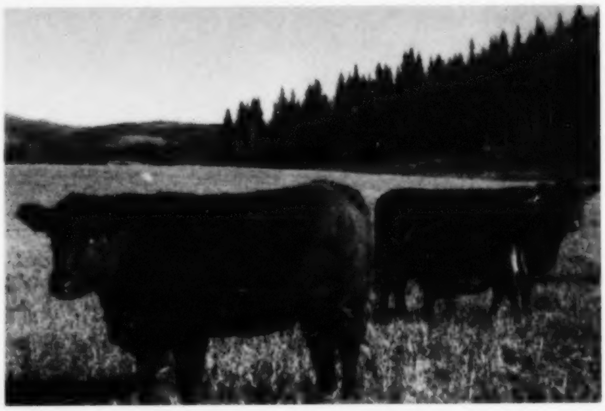
In order for plants to be productive, they must maintain growing points in order to re-grow after grazing. They must also maintain an energy source, either as leaves which can produce new energy, or stems and roots that contain stored energy. Plants that have had their leaves removed through grazing must use energy stores to produce regrowth. If this regrowth is continuously grazed before the new leaves can provide sufficient energy to rejuvenate the plant, these plants eventually lose their energy stores and are eliminated from the stand.

Removing cattle and resting pasture to allow the forage to recover from being grazed is critical to the long-term health and productivity of your pasture.

Succession in pasture management relates to the changes in the mixture of plants in your pasture. It is important to manage succession to maintain as many productive grasses as possible. Succession can move towards simpler, less productive species when cattle graze the fast regrowing species too frequently and leave the slower regrowing, less palatable species to survive.

Desirable species provide high quality production for a large part of the grazing season. These tend to be hardy species that have quick regrowth. Undesirable species are those that regrow slowly or are typically not consumed by animals. It is easy to see why you want to manage the health of your desirable species and reduce the number of undesirable species.

It is important to note that, as cattle graze uncontrolled in an area, they will graze the desirable species too frequently, making it easier for undesirable species to become more prominent in your pasture.



Managing/Controlling Non-desirable Species

As previously discussed, proper grazing management can be a very efficient way of controlling the non-desirable species; it will lead to a highly productive pasture by enhancing desirable species and eliminating slow regrowing species.

There are herbicides to eliminate undesirable species, but this approach can be costly; as well, it is often a short-term solution in that it treats the symptom and not the problem.

- It is often said that you can build a lot of fence for the cost of the chemical and this will likely have a longer-term benefit to both the pasture and your profitability.
- From a grazing standpoint, over grazing undesirable species is a method to reduce these grasses in a pasture. This is done by fencing the livestock into a small area for a short period of time where they are forced to eat and trample the species as much as possible. The higher the stock density, the less selective the cattle and the more successful the grazing practice to weaken the undesirable plants.

Be aware that some plants can be poisonous to cattle. Losing cattle from poisonous plant consumption is rare because it generally requires an animal to consume a significant amount of poisonous plant material, and these plants tend to be present in low populations in a pasture.

For more information on poisonous plants, check out this website:
http://www1.foragebeef.ca/$foragebeef/frgebeef.nsf/all/frg33

Stocking Rates and Carrying Capacity

The stocking rate or carrying capacity is defined as the number of animals that can be carried for a grazing season on a parcel of land without decreasing the future productivity of the pasture.

Stocking rates and stocking density are different concepts. Stocking density refers to the concentration of animals on a parcel of land at one time, whereas stocking rate is the number of cattle grazing a pasture as a whole, based on the productivity of the pasture for the year.

Develop a plan to match the animal numbers to the predicted forage yield well before the grazing season, in order to ensure you have enough pasture for your herd for the upcoming year.

Correct stocking rates are also critical to the long-term productivity of your pasture. You may be able to graze more animals in the current year, but your stocking rate may damage pasture productivity in the future by weakening desired species.

Stocking rates can be affected by a wide variety of factors: land productivity, climate, forage species, age of stand, soil fertility and varying forage productivity.

If you are unfamiliar with your pasture, the best way to start planning is to find the answers to a few specific questions: How many animals have grazed the pasture, on average, over the last few years? What is the current condition of the pasture, short and overgrazed, or healthy, with lots of carryover? What were the precipitation levels over the last couple years?

By employing an effective grazing program, it is possible to achieve animal distribution over the entire grazing area. It is difficult to have a high stocking rate when the animals spend the majority of their time on certain parts of the pasture rather than spread out over the entire grazing area.

Stocking Density

Stocking density relates to the number of animals in a particular paddock at any one time. Density is generally measured in pounds per acre. For example, a stocking density of 50,000 lb./acre of livestock is considered a reasonably high stocking density.

Optimal stocking density and pasture management make efficient use of the forage without waste but will still leave enough of the plant behind to have a quick and complete recovery.

High stocking density leads to uniform utilization of the forage species. In these circumstances, animals are required to graze almost all of the different species available, rather than just selecting the desirable species. The key is to use as many animals as possible in a group, to graze the entire paddock evenly, and then to move the cattle out of the area in a timely manner. This approach allows the desirable species to thrive rather than becoming weak from being grazed too frequently. High stock density also results in a more even distribution of manure and urine.

Some key ways to improve livestock distribution in your pastures are:

- Incorporate an adequate fencing program over the entire pasture that accommodates topographical features and utilizes available water in all the paddocks.
- Research has shown that a maximum distance of 800 meters is necessary to eliminate 'herding' to the water source. Having water located more than 800 meters from the grazing areas causes the cattle to trail to water as a herd and encourages them to rest near the water source after drinking. By offering water closer than 800 meters, individual cows will go to water as they get thirsty. Once satisfied, the individual animals return to the grazing area, either to continue grazing or to ruminate. This is important as it influences nutrient transfer by the grazing animal via manure and urine.
- Set salt and mineral out in different areas of the pasture, so the animals will go to these areas.

Good livestock distribution increases grazing capacity as cattle access more of the pasture and harvest a greater proportion of available forage. Improving livestock distribution may be one way to increase the size of your herd, or increase the grazing season without expanding the land base.

Calculating Stocking Rates

Pasture productivity could range from less than 1,000 lb./acre to over 6,000 lb./acre on a dry matter basis. This depends on climate, soil zone and management.

It is critical that you estimate forage production for each paddock on your farm instead of using average numbers.

The best approach is to use past information. If that is not available, measure your pasture's productivity based on sward height, a comparable hay yield or a conductivity meter.

If you require more grazing land, look for more pasture, or seed and graze annuals, using oats or fall rye, to avoid overgrazing your perennial pasture.

For more information on measuring forage production, see: http://www.extension.iastate.edu/Publications/PM1758.pdf

Use the following link for an example on calculating stocking rates: http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/agdex113

Water Management

Livestock require free access to plenty of clean, fresh water at all times in order to be productive. The actual water source and the watering site may not be in the same location. With intensive grazing systems, a water source should be available in every paddock. A surface or underground pipeline servicing these different sites from a central pressure system is all that is required. Given the technology today, pumps can be powered by electricity, gas, solar power or wind power. Depending on the topography of your land, gravity may even be feasible if a water source exists on higher level ground.

Pump water to a trough rather than giving animals direct access to dugouts, streams and bodies of water. Direct access to these watering sites can be detrimental to the cattle as well as the watering sites. The zones around these waterways are very sensitive to excessive cattle traffic. Direct access by cattle will cause increased erosion, muddy waterways and water contamination by manure and urine. Cows and calves can become trapped in mud holes and face an increased incidence of foot rot and muddy udders.

- Research has shown that cattle perform better on clean water that is pumped away from the water holes.

Capacity is a very important part of water management. For best performance, it is critical to have ample water available to the cattle when they need it. Water requirements depend on the number of cattle and the distance between water sites. The greater the distance between water sites, the more likely there will be peek demand periods when the cattle go for water in groups.

- On a hot day, a cow-calf pair may consume up to 20 gallons per day.
- Know the capacity of your pump and water storage.

Riparian Areas

Riparian areas are the areas adjacent to streams, springs or other water sources. As discussed in the environmental section, these are extremely sensitive areas.

For best protection of the riparian areas, fence off these areas and allow cattle to graze only during favorable times for specified durations. Avoid grazing these areas when they are excessively wet, as this practice can lead to significant deterioration of the area around the water source.

Although riparian areas may only make up a small part of your grazing area, they are extremely important for your water system. Riparian areas can also become invaluable grazing sources during drought conditions, as they may be the only green areas available. If cattle have direct access to riparian areas consistently, these areas will not remain healthy and will not have much forage available in a drought.

Proper nutrient management can have huge implications for the productivity of your pasture. Soil fertility is affected by pasture utilization and manure distribution of grazing cattle.

- Proper livestock distribution assists in manure distribution resulting in increased soil fertility and improved productivity.

The grazing system, as defined by the number of paddocks, rotation frequency, stocking density and water accessibility, affects livestock distribution and the distribution of nutrients throughout the pasture.

- Higher stocking densities and decreased grazing time will result in more uniform manure distribution.

A pasture with well distributed manure requires little extra fertilization.

Nutrient Management

Nutrients on a pasture cycle through the atmosphere to the soil, to pasture plants and to grazing livestock. The nutrients are then returned to the soil and atmosphere through manure and urine to start the cycle again. This manure and urine is an extremely valuable part of nutrient cycling.

Grazing management has significant effects on the nutrient cycle. By managing grazing through stock density and water availability, animals will defecate and urinate where they have grazed. If the grazing system is not appropriate, animals will transport the nutrients to water sites and loafing areas via their manure and urine each day. Over time this causes excesses in some areas and deficiencies in other areas.

Nutrients are also returned through the excess plant material which is not consumed and eventually broken down.

Generally, on most grass pastures, nitrogen is the limiting nutrient yet it makes up approximately 78 percent of the earth's gases in the atmosphere.

Nitrogen can be made available to plants in a usable form in the following ways:

- Atmospheric fixation–nitrogen moves from the atmosphere to the soil, generally through rainfall. Basically, the rain picks up nitrogen in the atmosphere as it moves to the soil.
- Legume fixation, where legumes take atmospheric nitrogen and fix it into the soil by rhyzobium bacteria living amongst the roots.
- Commercial fertilizer which is applied to supplement the pasture's nitrogen needs. It is very important to measure the economic impact of adding commercial fertilizer.
- Nitrogen applied by manual distribution of manure on the pasture, or as a byproduct of cattle feeding on the pasture so that manure and urine are used by the soil.

Forage Species

Pasture types are generally broken down into either native pasture or tame pasture. Native pasture tends to be pasture that is made up of plants indigenous to the region.Tame pastures are those that have been seeded to a specific variety or mix of introduced forage species.

Native pastures require more time in spring before they are at their optimal grazing stage. Native pastures tend to produce less than tame pastures, but through proper management can contribute significantly to a grazing system, especially in combination with tame grasses.

Tame pastures are made up of species of plants that respond well to grazing, and are selected based on the soil conditions, climate and compatibility with other species in your grazing system.

- There is a wide variety of species available for grazing. Thoroughly research the different species to determine how they will fit into your system before making your selection.

Legumes

Most species used for pasture fall into one of two groups, legumes or grasses. As mentioned previously, healthy legumes can fix atmospheric nitrogen into the soil which can be used by the other grasses in your pasture. Legumes can also be very valuable in a grazing system because they are high yielding and rich in protein. Most legumes have a taproot to access moisture much deeper than most grasses. Legumes, due to their nature, require a higher level of management to be used effectively. Proper grazing management and timing of grazing enhance stand persistence. Although legumes can be highly productive, bloat is a common concern.

Grasses

Grasses tend to be the most commonly used source for grazing. As you can see in the reference section, there is a very large variety of grasses available for grazing. Use different grass species to match production to different times of the year, varying soil conditions and grazing management. Mixing grasses and legumes tends to result in the most productive pastures.

Grazing Against Bloat

Legume bloat occurs when the animal has consumed too much of the fine parts of a legume plant relative to other coarser, non-bloating feed. The lack of mixture in the rumen predisposes the animal to bloat. To reduce the risk of bloat in cattle grazing legumes, you must remove the ability of the animal to select from the available forage. This is best done by increasing stocking density and moving the animals several times/day.

By frequent offerings of fresh forage and frequent depletion of the feed offered, the grazing pattern of the individual animal is to ingest as much feed as quickly as possible before the next animal gets it. This reduces selectivity, resulting in an adequate mix in the rumen of bloating and non-bloating feed.

More information on the different species can be found on the *Managing a Cow-Calf Business* CD.

Spring Stock-Piled Grazing

Grazing stock-piled forages requires young regrowth forage from the previous growing season to be set aside and harvested the following spring before the new growth begins.

- To efficiently use stock-piled grazing, a plan is required to ensure there will be high quality forage available from your planned grazing acres. Although there will be some degradation of this youthful regrowth over the winter months, the resulting quality will likely be adequate for the livestock intended.
- Stock-piled grazing can use excess forage from the previous grazing system or from a field that was harvested for hay the year before.
- In order to have good quality stock-piled forage, the grass should be vegetative at the end of the growing season. Forage that is too mature at the end of the grazing season will result in feed that is low in energy and protein and high in fiber.

Forage Establishment

For your grazing system, you will either have existing forage land available, or you will be required to convert cereal land to forage. There is good technology available to establish a stand of forage. If necessary, hire personnel and equipment to establish a new forage stand.

If your current grass or pasture land does not contain the species you desire, there are several alternatives to fix this. The traditional method was to plow or disc the field to break up the land to be re-seeded. This is costly, and you will lose at least one year of production.

Rejuvenating pasture without breaking the land requires additional management but may be more economical. With this option, it takes a few years to achieve the desired species.

Graze the sward so that sufficient rest is given to allow the desirable species to rebuild. Increase stock density to areas where undesirable species exist in order to weaken their presence. Fertilization is another option to rejuvenate your pastures and strengthen the stand.

Extending the Grazing Season

Extending the grazing season serves to improve the economics of the cow-calf enterprise. Given the high costs of mechanically harvesting a crop, the losses from storage and feeding and the cost to deliver the feed to the cattle, it makes economic and production sense to have cattle gathering their feed themselves.

There are several different strategies to extend the grazing season.

Select the Best Turnout Date

Turning cows onto spring pastures later will extend the grazing season. Turning cattle onto pastures prior to plant readiness reduces the plant's leaf area, reducing plant growth and overall production. It is estimated that turning cows out to pasture one day later in spring adds six days to the grazing season in the fall.

Swath Grazing

Swath grazing consists of cattle grazing directly from annual or perennial crops that are swathed in late fall. To reduce waste, allow cattle access to only one day's worth of feed.

Swath grazing annuals generally requires that the crop be seeded in mid to late June or early July and cut in the early dough stage. Oats or oat barley mixes are the most common cereals used for swath grazing.

It is very important to do a feed test on your swath grazing to ensure it has the required nutrients for grazing animals.

Advantages of swath grazing include:

- There are reduced costs associated with mechanical harvesting and feeding.
- Cows spread their own manure directly onto fields.
- Minimal yardage costs occur and cattle can use snow as a water source, creating further savings.

Disadvantages are:

- There is a higher risk of feed being lost due to increment weather.
- Cattle have slightly higher nutrient requirements from the added activity of gathering their feed.
- Time and management is required for moving fence in the winter.

Bale Grazing

Bale grazing is a combination of traditional feeding and grazing. In this case, bales are placed out on the feeding fields in the fall and cattle are restricted access by electric fence. The cost saving is that the feed does not need to be restacked when brought home from the hay fields as it is placed in the feeding fields directly from the hay fields.

Some planning is required to determine where to best place the bales for easy access, and what the greatest benefit is as far as nutrients from cattle manure and hay waste. As discussed earlier, bale grazing is an excellent way to import nutrients because you are taking purchased feed (nutrients) and you are left with feed waste and cattle manure in specific areas of the pasture.

Other Grazing Options

Other options could be grazing on stubble or chaff piles dropped in the field at combining time. This food source can be used by dry cows as a maintenance ration because it is generally low in protein and energy. Feed testing is important; supplemental feed may be required.

Grazing corn is an option for winter grazing. Because corn is a higher heat unit crop and requires high levels of nutrients, producers should research to find out if their climate and soil is suitable for corn. Some producers have been grazing standing corn on lands that are exceptionally high in soil nutrients from previous manure applications. Because of its high seed, herbicide and fertility costs, it is important that optimal production is achieved. Start with a relatively small field situated on a south slope to test how well it works for you.

It is important to monitor your cattle on these different rations to ensure adequate nutrition on an ongoing basis.

Matching Forage Production to Animal Requirements

Forage production tends to follow an S-shaped curve.

One of the difficulties with grazing management is that a large portion of the annual production of pastures occurs early in the year. When undisturbed, up to one-half or three-quarters of grass production may occur by the beginning of July. This means there is excess forage at this time of the year, compared to the calculated stocking rate.

It is important to be aware of this growth pattern when planning your grazing season, in order to maximize overall production.

As discussed in the nutrition section, cows' nutritional requirements change throughout the year, including during the grazing season.

- A cow's peak energy requirement occurs approximately six weeks after calving, at peak lactation. Therefore, it is very important that you know the value of the feed and how this corresponds to the needs of the cow at that time.
- Timing calving, to overlay the cow's peak nutrient supply with forage quality, is a significant strategy to minimize feed costs.

Grazing Management Challenges

The challenge for the grazier is to bring the cattle through the pastures in early summer to simply clip the tops of the forage and to trample the grasses back to stimulate regrowth. The duration within any paddock is short and the stocking density must be high for this clipping and trampling to be effective. Upon returning to these paddocks the second time, the stay can be longer for the cattle to do a more thorough harvest of both the regrowth and the original feed still available. Another tactic is to hay particular paddocks to stimulate regrowth.

Grazing and Paddock Setup

To achieve desirable grazing control, start with at least eight paddocks in order to give the forage sufficient recovery time before it is re-grazed.

Although exact cattle movements cannot be planned out for the entire grazing season because growing season is ultimately determined by the plant's access to moisture, heat, sunlight and soil nutrients, it is still critical to establish a "most probable" scenario.

The rule of thumb is that when grass is growing quickly, the producer should move the cattle frequently, and when grass is growing slowly, move the cattle less frequently. This is to prevent grazing regrowth within a stay in the paddock and to allow return of the cattle before plants head out and stop growing.

Set up your paddocks with consideration given to similar species type and land topography. Avoid having paddocks with both native and tame grasses, or significantly different soil attributes. Use temporary subdivisions when starting a grazing program for easy adjustment.

Pumping water to different areas or paddocks can be done quite affordably over the long term. Only use laneways as a last resort because of the limitations they offer for healthy nutrient cycling.

More specific information on paddock design can be found on the web at:
http://www1.foragebeef.ca/$foragebeef/frgebeef.nsf/all/frg42
http://www1.foragebeef.ca/$foragebeef/frgebeef.nsf/all/frg81

Fencing Methods

Fences tend to be either barbed wire or electric. Often perimeter fences have four barbwires, with one wire being electrified as a carrier wire.

For economic reasons and because of their flexibility, most cross fences are electric. Once cattle become accustomed to electric fences, a single electrified wire is adequate to keep them in the desired area.

The critical components to a good electric fence are:

- A reliable, low impedance, high-voltage energizer that can either be battery operated (with the option of being solar powered) or plug-in powered.
- A well insulated fence.
- Galvanized grounding rods adequate for the energizer in use and area moisture conditions. In drier areas, more rods are needed. Ground rods are best placed under the over hangs of buildings to maximize soil moisture advantages.
- Good connections with the wires, the ground, as well as any splices made in the fence, to ensure there is no power loss down the fence.

Grazing Tips

- Start small; take one step at a time. It is impossible to know where every cross fence is going to go in the first year!
- Rest for recovery is a good thing. For your forage too!
- Match the cows to the forage.
- Grazing too much or too little are both costly.
- Understand your soil, the climate and the species available to your area.
- Plan, but remain flexible.
- Collect information, keep records and monitor performance.
- Always look for more or healthier desirable species.
- Don't forget about water!
- Clean water, available from an optimally-located trough, improves pasture productivity significantly.
- Take advantage of others' experiences.
- Don't be afraid to try something different.
- The longer the cows are able to graze, the less you will have to feed them.
- The pasture and the grazing of livestock are a system and have natural cycles. Take advantage of these processes as much as you can.
- Use your grazing and feeding management skills to improve soil fertility and nutrient flow.

Summary

In order to be a good manager, planning is necessary. As a producer, you must understand the concepts of grazing as well as the resources available to manage your grazing operation.

There are four basic principles of grazing management as outlined on Foragebeef.ca:

- Balance the number of animals with the available forage supply
- Obtain a uniform distribution of animals over the range
- Alternate periods of grazing and rest pastures to manage and maintain vegetation
- Use livestock most suited to the forage supply and your objectives.

7. Environmental Best Management Practices

Environmental Best Management Practices

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Overview

The word "ranching" in the Alberta context brings to mind cattle grazing in rolling foothills with belly deep native grasses, clean rivers and streams and an abundance of rangeland wildlife.

Although there is a great deal more to ranching today than we may see in that picture of the old west, Alberta's rich natural resources remain the foundation of our beef cattle industry. Ranchers and farmers have always felt a strong connection to the land and have an innate understanding of the connection between beef production and the environment. With the increasing public pressure on resource-based industries to be accountable for the decisions that impact the environment, it is critical to make management decisions that will protect the diverse ecosystems in which you operate.

Key Terms

Riparian Area

These are the lands adjacent to streams, rivers, lakes and wetlands, where the vegetation and soils are strongly influenced by the presence of water. Although they make up only a small fraction of land, they are among the most productive and valuable of all landscape types and have been the focus of conflicts among resource users.

Biodiversity

This refers to the number and variety of organisms found within a specific geographical area.

Biodiversity is an indicator of health in a specific area. Each species in an environment performs a specific function, and each species relies on others for survival. The more diverse the ecosystem, the better equipped it is to respond to changes or stress, such as floods, droughts, pests and disease.

Learning Objectives

The producer will:

- *Gain an understanding of the impact of a cow-calf operation on the environment*
- *Learn to identify management strategies that can reduce the impact on the environment*
- *Develop an environmental management plan.*

Environmental Considerations

Soil Management

Good soil quality is the foundation of plant growth for grazing and hay production. It can be compromised by inappropriate practices, including excessive grazing, excessive cultivation or improper application of manure, fertilizer or pesticides.

Factors that affect soil quality and productivity include erosion, compaction and organic matter content.

Soil Erosion

The definition of soil erosion is the detachment and movement of soil from one place to another by means of water, wind or man. Erosion removes topsoil, resulting in lower productivity through loss of nutrients and organic matter. Water quality and habitat can be compromised when soil particles are deposited in water bodies, particularly if these particles are carrying pesticide residue or manure.

Exposed soil is especially at risk of erosion through wind or water. Examples of management practices that can help to minimize exposure of soil include the following:

- Avoid excessive grazing, by moving cattle frequently and monitoring plant populations and soil coverage. Good plant populations essentially hold down soil particles and help to minimize the risk of erosion.

- Use common sense when incorporating manure after application to the soil. Incorporation reduces odor, prevents nutrient losses and mixes organic matter into the soil. However, the method of incorporation should be appropriate to the soil type, crop plan and climatic conditions of the area.

Some soil types and topographies are more prone to soil erosion than others. Understanding the erosion potential in your geographic area is critical to making management decisions that minimize that potential.

For more information on soil quality, go to http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/sag6953 on the *Managing a Cow-Calf Business* CD.

Soil Compaction

Healthy, productive soils are porous, meaning water and nutrients can pass through easily and be accessed by plant roots. Excessive pressure exerted on soils over extended periods of time can decrease the porosity of the soil. This is known as compaction. Symptoms of compacted soils include:

- Uneven plant growth
- Nutrient deficiencies
- Plant water stress
- Shallow root systems.

Compacted soils do not absorb water as easily as porous soils, through rainfall, irrigation, spring runoff, etc. Water that is not absorbed into the soil needs to go somewhere, and runoff is accelerated. As the runoff accelerates, it begins to take soil with it, leading to soil erosion.

Farm traffic, such as tractors and grazing livestock, can cause compaction. One hoof of a mature cow exerts 20 to 30 pounds of pressure per square inch. Allowing cattle to graze too long in one area can lead to compacted soils.

Sustainability

This refers to a characteristic of a process or state that can be maintained at a certain level indefinitely. In relation to agriculture and the environment, it can be defined as meeting the needs of the present without compromising the ability of future generations to meet their needs.[1]

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[1] United Nations. 1987.
"Report of the World Commission on Environment and Development."
General Assembly Resolution 42/187, 11 December 1987. Retrieved: 2007-04-12

Soil Organic Matter

Soil organic matter is primarily plant matter in various stages of decomposition. Organic matter occurs in all soils; however, the amount varies widely depending on location.

Organic matter serves many purposes, including:

- Holding soil particles together, therefore reducing the risk of erosion
- Improving soil structure, workability, water infiltration and water holding capacity
- Storing and supplying nutrients that are essential to plants and soil micro-organisms.

Soil organic matter content is influenced by climate, fertilizer use, tillage and grazing practices. Management practices that increase soil erosion also increase the loss of organic matter.

Water Quality

Activities within an agricultural operation have a direct impact on water quality. What we do on the land, through cropping and livestock activities, can produce contaminants that can enter surface and groundwater throughout the water cycle. Impacts on water quality can restrict the suitability of water sources for uses including stock watering, irrigation, potable water, fishing and recreation.

Elevated nutrient levels in surface water sources such as rivers, lakes and dugouts can be caused by manure or fertilizer entering that water source directly, or by runoff from fertilized fields and livestock sites. Spills, improper storage and over-application of fertilizer or manure may lead to excess nutrient concentrations in soil and runoff.

Groundwater is the water that collects in the pore spaces of soil and rocks. Aquifers are water bearing layers that hold groundwater in usable amounts. Aquifers are sources of water for human consumption, stock watering and irrigation. Contamination of groundwater can occur when excess nutrients are applied to soil through manure or fertilizer application. Plants use what they need, and the excess nutrients can leach out of the root zone into the groundwater below. Seepage from improperly constructed manure and silage storage sites can also lead to groundwater contamination.

Air Quality

Cattle produce methane and nitrous oxide, two gases that have been identified as having an impact on global warming. All animals produce methane during digestion, but cattle and other ruminants produce more because of the slow fermentation of feed in the rumen.

The amount of methane emitted by an animal can be influenced by feed efficiency. To increase feed efficiency, feed higher quality feed and rations. Adding lipids to the ration, such as canola oil, adds energy and decreases methane production. Bacterial supplements added to feed can help to convert methane in the rumen and improve overall digestion.

Research indicates that as much as 80 percent of the nitrogen that cattle ingest through feed is excreted in their manure and urine in the form of methane and nitrous oxide. Manure emits more methane when it decomposes under low oxygen conditions, for example, poorly aerated manure piles. Manure management practices can influence the amount of methane released into the atmosphere.

- Incorporating manure into the soil after application ensures that the nutrients are bound to the soil where plants can use them, and less gas is emitted into the atmosphere. However, keep in mind that inappropriate incorporation can lead to soil erosion.

Biodiversity

A common indicator of poor biodiversity is a large number of undesirable species (for example, weeds), and these weeds can be considered biological polluters. Poor management of the livestock, land and water can lead to poor biodiversity. This is discussed in more depth in the grazing section.

Biodiversity is simply "biological diversity". It refers to the number and variety of organisms within a geographical area. It is also an indicator of environmental health in a specific area. Each species in an environment performs a specific function, and each species relies on others for survival. The more diverse the ecosystem, the better equipped it is to respond to changes or stress such as floods, droughts, pests and disease.

Each species in an agricultural ecosystem is part of a web of relationships that, together, perform environmental functions. These functions include:

- Protection of water quality
- Regional water cycling
- Nutrient cycling
- Maintenance of soil fertility
- Pollination
- Pest control
- Climate regulation.

As cow-calf producers, we are responsible for managing that web of relationships and allowing those functions to continue to happen. Management practices that protect soil, water and air quality are practices that protect biodiversity, and these practices include:

- Rotational grazing
- Weed control
- Leaving carryover
- Maintaining healthy riparian areas along surface water bodies.

Photo: Sam Wirzba
and Alberta Beef Producers

Riparian Areas

Riparian areas are the lands adjacent to streams, rivers, lakes and wetlands where the vegetation and soils are strongly influenced by the presence of water. While these areas represent only about 5 percent of Alberta's total grazing land, they are vitally important for forage production, fish and wildlife habitat and protecting our water supply and quality. Riparian areas are characterized by the presence of water (seasonally or all year round), plants that require abundant water and soils that have been modified by abundant water. Riparian areas do not all look the same, but usually the "green zone" is relatively easy to identify.

The presence of water makes these soils especially susceptible to compaction, which as we have already learned, reduces soil productivity and vegetation growth. The absence of vegetation leaves the soil exposed to erosion from wind and water and results in less desirable habitat for wildlife as well.

Prolonged presence of cattle when the soils in the riparian area are saturated causes compaction and could lead to the vegetation becoming overgrazed. Damaging these sensitive areas reduces the riparian area's ability to perform its functions and act as a buffer to help preserve water quantity and protect water quality.

For further information, go to
http://www.cowsandfish.org/
http://www.cowsandfish.org/greenzone.html

See the accompanying *Managing a Cow-Calf Business* CD for Pest Management resource links including:
http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex32
http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex9350
http://environment.gov.ab.ca/info/posting.asp?assetid=6232&subcategoryid=215

Pesticides

Pesticide application can be a means of controlling weeds, insects and other pests. However, these products can also be a risk to non-target organisms and have an adverse effect on biodiversity.

Mismanagement of pesticides can harm beneficial insects, inhibit plant growth and reduce the viability of forage varieties. Consumption of contaminated plants can harm livestock and wildlife. Some pesticides accumulate in plant and animal tissue and can ultimately be a serious risk to human health. The severity of pesticide contamination depends on the toxicity and management of the pesticide in question.

The key to proper use of pesticides is proper identification of the pest species. Use may not be necessary until the economic threshold of the pest population has been reached. There may be alternative methods of pest control rather than simply applying a chemical pesticide.

Pharmaceuticals

A number of pharmaceutical products are used in the cattle industry, including antibiotics and hormones. Most of these products are completely broken down in the animal's body. There can be a very small amount of residue present in manure; however, to date there has been no evidence that residues from pharmaceuticals used in cattle production have created problems with the health of humans, wildlife or the environment.

Pathogens

Pathogens are micro-organisms that cause disease. Pathogens exist in manure. Ingestion of feed or water contaminated by manure can cause disease in animals. Humans can contract disease by drinking contaminated water, swimming in manure contaminated water and by not washing hands after handling infected livestock or manure.

Several steps need to occur in order for manure pathogens to cause disease through water contamination. If any of these steps are blocked, disease transmission cannot occur.

1. The pathogen has to be excreted by the animal. Not all pathogens are found in every animal and some can be reduced through management or medication.
2. The pathogen has to reach a water supply.
3. The pathogen must remain alive and able to cause infection after being ingested. Heat, cold and dryness can destroy pathogens in a relatively short time frame.
4. The pathogen must be ingested in high enough numbers to cause infection.The number depends on the pathogen.

Management practices that can help producers avoid contamination of water sources include:

- *Limit direct access to surface water sources.*
- *Prevent runoff of manure into surface water sources.*
- *Use proper manure and silage storage practices to avoid seepage and groundwater contamination.*
- *Maintain healthy riparian areas to filter runoff and help stop contaminated soil particles from entering water bodies.*

Site Management

While not every aspect of your selected site is within your control, such as the slope, topography or soil type, understanding those aspects can help you to implement management strategies that make the best use of the site while controlling potential risk areas.

Wintering Site Management

Alberta's cold, snowy winters mean that in most areas of the province cattle will not be able to graze year round and it will be necessary to provide feed for the animals. The area where cattle are fed over winter is referred to as a wintering site. As cattle may be fed and bedded for extended periods of time, manure and bedding accumulates and can pose significant risks to surface and groundwater.

Seepage of nutrients and contaminants into groundwater can occur wherever runoff collects and stands. Manure stockpiles and silage storage systems have potential to be seepage risks. As well, cattle wintering sites can pose a risk for groundwater contamination. The key to managing this risk is controlling cattle density at wintering sites and moving the animals frequently to distribute manure more evenly.

Wintering sites, manure and silage storage are regulated by the *Agricultural Operation Practices Act*.

Refer to the links below for further information:
http://www.qp.gov.ab.ca/documents/Acts/A07.cfm?frm_isbn=0779742621

http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/epw8746

Surface Water Considerations
To evaluate risks to surface water supplies, consider the following:

- Topography, slope and proximity to water bodies: *Where does the water run when it leaves your proposed site? What will that water be taking with it?*
- Soil type: fine to medium textured soils are more prone to erosion than coarse soils.
- Precipitation/climate: a greater risk of water erosion exists where large and intense rain events are the norm.
- Flood hazard: locating wintering sites in high flood risk areas increases the changes of contaminated runoff.

Good Practices for Wintering Site Management

- Maintain a healthy vegetative cover around water supplies and on wintering sites to control spring runoff.
- Move cattle frequently or move mineral, salt, feed, etc. to force the animals to move around the wintering site and disperse manure more evenly.
- Use portable windbreaks and move them around over the duration of the winter months.
- Know and understand the soil type, water table depth and drainage characteristics of your wintering site. This will help you to use common sense when deciding where to feed and bed your cattle for the winter.

Managing cattle density on a wintering site can be done very simply and inexpensively. Moving mineral and salt supplies forces the animals to move around the site and naturally spreads manure. If possible, moving or alternating the water source has the same effect; however, this is not always feasible.

Water Supply Management

Water Sources

Having a reliable, clean water source for livestock is a critical part of site selection for a cow-calf operation. Common sources of water include wells, dugouts, sloughs, streams and creeks. All water uses are subject to licensing by Alberta Environment. Good management of your water source can help to ensure the quality and longevity of that source.

No matter what your water source, it is vital that you understand the source and how it is replenished. For example, if your main source is a well, the amount of water pumped out of that well must not exceed the recharge capacity of the aquifer that is supplying it. If your source is a dugout, it should be large enough to hold at least a two-year water supply.

Constructed water sources such as wells or dugouts require licensing by Alberta Environment.

Specialists at Alberta Agriculture and Food (AF) or with the Prairie Farm Rehabilitation Administration (PFRA) are available to help choose the appropriate source of water for your operation and they can also provide help with developing that source.

See the following links to AF and PFRA water supply and management information:
http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/wwg418
http://www.agr.gc.ca/pfra/water/intro_e.htm

Water Bodies

Water bodies are simply locations where water flows or is present year round or intermittently, and generally refer to naturally occurring water–for example, streams, lakes, sloughs and creeks.

Cattle should not have direct access to any water body. Wet soil around a water body is more prone to compaction by cattle traffic; compacted soils are less productive and limit the growth of vegetative cover. Vegetative cover is essential for trapping snow, filtering runoff, preventing erosion and providing wildlife habitat.

Watering Systems

A number of options exist for offsite watering systems. Choosing the right one for your operation depends on your site, your water type, the number of animals and the intensity of your operation. Examples include:

Pasture pipelines: a relatively inexpensive offsite watering solution for sites within two or three kilometers of a power source and a reliable water source.

Solar and wind powered pumping systems: costs can run from $1,000 to $10,000 for these units; however, there are a number of designs available that can make them the most practical solution for most operations.

Gravity fed systems: ideal for sloped pastureland where a dugout can be located upslope from the watering site.

Nose pumps: at a cost of about $10 per cow-calf pair, nose pumps can be a cost effective option for offsite watering. There are nose pumps that can be used in the winter months as well as summer.

Access ramps: where it is impractical to install an offsite watering system, the minimum improvement that can be made is installing an access ramp. The ramp protects the soil around the water source from compaction and provides better footing for cattle to water from the source.

Water hauling: in intensive grazing systems, the most practical water source may be hauling water to the cattle. This will not be practical for large, extensive grazing systems on range.

For more information about watering systems: http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex644

Good Practices to Prevent Contamination of Your Water Source

- Ensure that wells are properly constructed and sealed.
- Locate wells upslope from cattle facilities.
- Decommission abandoned wells properly. These wells must be sealed to prevent groundwater contamination and thus contamination of newer wells.
- Implement manure management strategies to prevent seepage and leaching of nutrients into groundwater.
- Don't construct a dugout in a water runway. Consider what will be coming with the runoff when it enters your dugout.
- Apply manure and fertilizer to meet crop needs. Ensure application is at least 30 metres away from your dugout.
- Use a watering system to limit direct access to your water source.

Manure Management

Manure is an unavoidable byproduct of livestock production, and while there are potential environmental risks that exist because of it, it can be a valuable source of nutrients and organic matter that can be recycled back into the soil. The key is appropriate management of the resource to maximize benefits while minimizing risk.

In this section we have already addressed some of the potential risks that exist with manure. To sum up, they are:

- Contamination of surface water bodies and groundwater with excess nutrients and/or pathogens through runoff or leaching
- Reduction of air quality through emission of nitrogen gases
- High salinity in manure, thereby decreasing soil quality.

The nutrient content, and therefore the value, of manure will vary depending on what the animal is fed, bedding material, and manure storage and handling. Generally the nutrients that are available in manure are nitrogen, phosphorous, potassium, calcium, magnesium, sodium, sulphur and micronutrients.

Manure can be used in place of chemical fertilizer, but it is critical that the manure be tested so the exact nutrient composition is known. Without this information, it is impossible to balance application rates with plant needs.

We already know that applying more nutrient to the soil than the plant population can use will result in leaching and/or runoff. By testing the manure, and regularly soil testing the land on which manure is applied, the level of nutrient in the soil can be monitored and over-application can be avoided.

Manure management is also affected by the overall management of the cattle herd, particularly the approach used to feed the herd. Manure concentration is generally an issue when cattle are fed in confined places, such as corrals.

Allowing cattle to stay on pasture, or in larger areas, allows cattle to distribute the manure directly onto the fields, and reduces the risk of runoff contamination, as well as the cost of having to mechanically move the manure from the corrals onto the field.

Good Practices for Managing Manure and Compost

- Do not apply manure near water bodies.
- Adhere to minimum setback distances from water bodies and residences as outlined in AOPA.
- Avoid surface application of manure on frozen soil.
- Do not apply manure in low, wet areas.
- Leave crop residue on the surface and reduce tillage.
- When a high amount of nitrogen is required, apply two-thirds manure and one-third mineral fertilizer.
- Apply manure to the land in the spring when plants are actively growing and using the nutrients.
- Do not apply if heavy rain is forecasted.
- Apply manure on humid and/or cold, calm days to reduce odor.
- Incorporate manure to avoid losses by runoff.
- Do a soil test, especially for phosphorous, every three years to avoid overapplication.
- Test soils in different areas–hills, low areas, flats–to monitor where nutrients are accumulating.
- Apply manure according to soil test recommendations, crop needs and manure analyses.
- Do not apply manure where it can run into surface water that leaves your property and enter a common water body.
- Test soil for pH and electrical conductivity levels to monitor salinity. Manure can contain high levels of sodium which can adversely affect soil quality and productivity.

See the accompanying *Managing a Cow-Calf Business* CD for resource links including: http:/www1.agric.gov.ab.ca /$Department/deptdocs.nsf/all/epw8834

Manure Storage

The high water content of fresh manure makes it very heavy and expensive to transport. Reducing the moisture content can make manure use more economical. Stockpiling manure is a common method of reducing the moisture, as the moisture content decreases over time. However, as the manure sits in one pile for an extended period of time, the risk of nutrient leaching and contamination of groundwater increases. Understand your soil type and water table when you select a site to stockpile cattle manure.

For more information on record keeping requirements and nutrient management planning.
http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/epw8746
http://www.qp.gov.ab.ca/documents/Acts/A07.cfm?frm_isbn=0779742621

Table 1 Average Nutrient Content (in kg/tonne) & Moisture Content of Livestock Manures

	Nitrogen kg/tonne	Phosphorus kg/tonne	Ammonium-N (NH_4-N)	Moisture
Beef	10.0	2.4	2.6	50%
Dairy	4.0	0.9	1.8	92%
Hog	3.5	1.1	1.6	96%
Chicken	16.0	12.2	12.3	60%
Turkey	18.6	6.5	12.4	35%
Sheep	7.0	2.0	2.8	50%

Values from the 1995 Code of Practice for the Safe and Economic Handling of Animal Manures, AAFRD, Agdex Bulletin 400/27-2, and the addendum to the 1995 Code of Practice issue May, 1999

Grazing Management

The foundation of a cow-calf operation is pasture and grazing. Managing grazing resources is also important for maintaining wildlife habitat and biodiversity. The grazing management section of this manual discusses grazing management and grazing systems in depth.

The goal of grazing management from an environmental standpoint is to minimize a cow-calf operation's footprint on the range and pasture land.

Good practices for grazing management:

- Keep pasture covered with desirable and healthy forage plants to reduce the potential for wind and water erosion.
- Improve water holding capacity of the land and prevent rapid runoff of rainfall.
- Pump water out of streams and water bodies to a proper location, to eliminate cattle urinating and defecating directly into these water sources, as well as reduce the risk of contamination through runoff.
- Balance forage supply with livestock production.
- Remove older plant material that is less vigorous, and allow light to penetrate the plant canopy to reach lower, younger leaves.
- Control stocking rates and recovery periods to avoid overgrazing.
- Move mineral, salt and offsite watering systems to encourage cattle to move around the pasture making better use of the grass and dispersing manure more evenly.

Understand the growth habits of the grass species in your pastures to avoid using them at sensitive times.

Pest and Predator Management

Biodiversity is an important indicator of the health of an environment. While each species and organism has its fit within the ecosystem, some can have serious economic impacts on a cow-calf operation, and their populations need to be controlled. It is important to balance the control method chosen with the extent of the problem and to understand the potential impacts of the control method on desirable plant and animal populations.

There are four main types of burrowing animals that cow-calf producers must deal with in Alberta: gophers, moles, field mice and badgers. Approved poisons, used in combination with trapping and hunting, can be very effective in controlling rodents. Predator control products are regulated much more closely in Alberta than they were in the past. Contact your local municipality for more information on these control measures.

Rodents dig holes in pastures and crop land that can be hazards for cattle, horses and machinery. Large populations of rodents can seriously compromise grazing resources and damage crop yields. The most effective methods of control of these pests are poisons, such as strychnine or zinc phosphate. However, use care with these products so that only the target pests are controlled.

Alberta's rangelands, fields and forests are also home to a number of wild ungulates including deer, moose and elk. These ungulates can cause serious damage to crops, swath grazing land and bale stacks. They can also damage fences.

To manage your feed stocks to avoid large losses to wildlife, wrap your round bales and stack them at least two bales high. Clean up spilled grain, loose hay and other feed in your farmyard. Do not allow wildlife to linger because they will attract other wildlife. Contact Alberta Fish and Wildlife for information on other prevention programs.

There are also predatory wildlife species that roam our fields and forests such as wolves, coyotes, bears and cougars. The number and type of predatory species you may have to deal with depends on where you are located within the province. Alberta Agriculture and Food manages predation by coyotes under the *Agricultural Pests Act* of Alberta, and Alberta Sustainable Resource Development manages predation by other species.

Some prevention strategies for predators include the following:

- Dispose of dead livestock, including stillborn calves, by liming and deep burial.
- Calve as close to the farmyard as possible to allow for surveillance. Check cows regularly during calving; predators are opportunistic and a heifer having trouble calving is a prime target for a predatory animal.
- Carry a rifle when checking your herd.
- Use guard dogs.
- Use electric fencing to keep predators away from young stock, in particular.
- In some cases, use restricted poisons for coyote control when predation has occurred and proof can be shown that losses have been suffered.

Insect pests such as grasshoppers can be extremely destructive to feed crops and grassland. Often, these pests will invade a forage crop first. Controlling grasshoppers with chemicals around the perimeter of a pasture or hay field may be effective in stopping the pests from moving into land seeded to feed crops. There are a number of chemicals registered to control grasshoppers; however, it is important to note that these insecticides will also control many beneficial insects, such as bees. Balance the control method with the potential for economic damage.

Feed Storage

Silage Storage

Silage is a highly palatable and nutritious source of feed for cattle. However, the ensiling process requires that the silage crop be harvested at high moisture content. Because of the high moisture content, there is potential for seepage. Silage seepage contains high concentrations of nutrients and acids that can contaminate surface water sources through runoff and groundwater through leaching.

Locate silage storage sites well away from watercourses and flood plains. The floor of the pit and the sides must be in good condition and leak-proof. If possible, use a clay liner or concrete pit to reduce risk. Ensure that the silage is covered and that the cover is leakproof. Do not store silage in an area with a high water table.

Grain Storage

Fusarium graminearum, or head blight, is a disease of cereal crops that is prevalent in Manitoba and has caused serious economic damage to farmers in affected areas. Cattle are able to digest barley infected with head blight and the fungus is destroyed by their digestive systems, so spreading manure is not generally considered a risk. The risk in Alberta is spilling infected grain and using straw from infected crops. Take care when transporting, loading, storing and feeding cereal grains to avoid spillage and contamination of Alberta cereal crops.

Hay Storage

Buying hay from other geographical areas can introduce new weed species to your pastures and hay land. Feed purchased hay on crop land that will be blanket sprayed or silaged the following year; this will allow for the control of any non-native weed species. It is also important to store hay away from water sources, and in an area where there is limited access from wildlife. Store hay away from buildings, shelterbelts and power lines to avoid fires.

Disposal of Wastes

Farm Waste

Farm and ranch owners do not have the luxury of garbage pickup and recycling programs. In the past, farm waste was buried or burned in pits or barrels. With today's knowledge of air pollution and groundwater contamination, these practices are no longer considered acceptable under most circumstances.

Some farm waste poses potential hazards to the environment and to human and animal health. To avoid contamination, serious illness or death, this section discusses some of the types of waste common on farms and how to dispose of them safely.

Disposal of Dead Animals

Death loss is natural on a livestock operation. Dead animals must be disposed of properly to avoid attracting predators, causing unsightly messes and odor, and preventing disease. Disposal of dead animals is regulated by *The Livestock Act* of Alberta. The Act states that disposal must occur within 48 hours unless the carcass is frozen. Disposal options permitted in Alberta include:

- Transportation of the carcass from a farm to a rendering plant. The carcass should be kept as close to the farm entrance as possible so that the truck does not have to pass through the yard.
- Store the carcass away from all waterways or areas where it can be easily scavenged. Use a bin or other storage container.
- Burial
- Burning (within regulations)
- Composting
- Sending to a Class I or II landfill
- Natural disposal–scavenging (only permitted where the animal was not euthanized with drugs or chemicals, or suspected to have died of an infectious disease that can be spread by scavengers).

Regulations

Natural disposal is obviously the easiest method of disposing of a dead animal. However, it is not appropriate to drag the carcass out to a field and leave it there. The Destruction and Disposal of Dead Animals Regulation contains the following guidelines for natural disposal, including burial of an animal.

The total weight of carcasses in a burial pit must not exceed 2500 kg. The pit must be:

- 100 m from wells, waterways and high water marks of lakes
- 25 m from the edge of a coulee, major cut or embankment
- 100 m from any livestock facility that is not owned or leased by the owner of the animal
- 100 m from a residence
- 300 m from a primary highway
- 100 m from a secondary highway
- 50 m from any other road.

The pit must be covered with:

- A minimum of 1 m of compacted soil
- A wooden or metal lid that is designed to exclude scavengers. Apply quicklime to the carcass in sufficient quantities to control flies and odor.
- The bottom of the pit must be at least 1 m above the seasonal high water table.

According to The Destruction and Disposal of Dead Animals Regulation, burning dead livestock must be done in a certified, commercial quality incinerator that produces a long-term, high temperature burn sufficient to completely dispose of the carcass.

Disposal Sites

The total weight of the carcasses disposed of at any one site may not exceed 1000 kg. There must be at least 500 m between disposal sites. The site must be:

- 500 m from wells, waterways and high water marks of lakes.
- 25 m from the edge of a coulee, major cut or embankment
- 400 m from any livestock facility that is not owned or leased by the owner of the animal
- 400 m from a residence
- 400 m from a road allowance
- 400 m from a provincial park, recreation area, ecological reserve or wilderness area.

The site must not create a nuisance.

Composting is defined as a controlled, natural biological process of decomposition of organic materials in a predominantly aerobic environment. It takes six to eight months for a bovine carcass to be properly composted. The Destruction and Disposal of Dead Animals Regulation contains the following guidelines for composting:

The site must be:

- 100 m from wells or other domestic water intakes, streams, creeks, ponds, springs and high water marks of lakes
- 25 m from the edge of a coulee, major cut or embankment
- 100 m from any livestock facility that is not owned or leased by the owner of the animal
- 100 m from a residence
- Designed in a manner that will exclude scavengers.

In addition:

- Each animal part must not exceed 100 kg
- The maximum volume of the animals or parts of them must not exceed 25 percent of the total compost pile
- The animals or parts of them must be covered by at least 15 cm of composting material.

If an animal is suspected to have died of a reportable disease, that death must be reported and disposal practices will be regulated by the *Health of Animals Act* (Canada).

Disposal of Veterinary Wastes

There are two main types of veterinary wastes that a cow-calf producer must deal with.

One of these is sharps–needles, syringes, empty or expired pharmaceutical containers, etc. There are no regulations for disposing of sharps in agricultural operations. However, there is a risk of injury or contamination if these wastes are not disposed of appropriately. Separate sharps from other waste and use disposal facilities that accept veterinary wastes.

The other type of veterinary waste is medicine. Unused expired drugs can be returned to the supplier who can have them disposed of appropriately. Opened containers can be discarded in the same way as sharps.

Community Relations

Noise and Odor Management

Increasing scrutiny on agriculture, food safety and the impact on the environment makes it absolutely critical that farm operations of all types pay close attention to potential sources of conflict with neighbors, communities and other producers.

Government agencies and commodity groups have begun initiatives over the past decade to increase public support of agriculture, and to demonstrate that proactive steps are being taken to ensure food safety and the industry's commitment to environmentally sustainable management practices. Individual producers have a responsibility to do their part to uphold these initiatives and maintain public support.

Potential sources of conflict that are within a cow-calf producer's control include the following:

- **Manure odor:** sound manure management and common sense when applying and incorporating manure are essential. For example, you should not apply manure next to a neighboring residence on a windy day when the neighbors are hosting a summer barbecue.
- **Ground and surface water contamination:** proper placement of watering and wintering sites can alleviate this concern.
- **Riparian areas:** proper management of these green zones can improve water quality and quantity, increase forage production and allow for recreational enjoyment.
- **Dead animal disposal:** proper disposal of dead animals within 48 hours of death is critical to avoiding odor, flies, unsightly messes, transmission of disease and predator attraction.
- **Noise:** rural Alberta is becoming more and more populated with non-farming residents who do not necessarily understand that some noise is unavoidable as farmers and ranchers go about their operations. Be courteous; let neighbors know what will be done and when. This may avoid potential conflicts over noise from machinery operation, moving cattle, weaning, etc.

Handling Conflicts

Handling conflicts quickly, respectfully and courteously can stop them from becoming bigger and more difficult to resolve. No matter how unreasonable the complaint may seem, it is important to take it seriously and handle it appropriately. Admit to mistakes and apologize if necessary. Be diplomatic and stay calm. Ask lots of questions and acknowledge your understanding of the concern.

Consequences of failing to handle conflicts appropriately can mean bad publicity, lost credibility, fines and penalties, project delays and litigation, and ultimately could lead to more regulation for the entire industry. A proactive, cooperative approach to managing conflicts and building relationships with non-agricultural neighbors and communities ensures continued support for agricultural producers.

Environmental Legislation

Following is an overview of the various acts and legislation that affect Alberta cow-calf producers along with relevant website links.

Agricultural Operation Practices Act (AOPA)

For cow/calf producers, AOPA deals with two main issues: nuisance and manure management. The Natural Resource Conservation Board enforces this piece of legislation; producers must ensure that they understand the regulations and are in compliance with them.

http://www.qp.gov.ab.ca/documents/Acts/A07.cfm?frm_isbn=0779742621

Environmental Protection and Enhancement Act (EPEA)

The EPEA applies to the release of substances that cause or may cause an adverse effect on the environment, human health or safety and property. Release of such a substance may result in fines ranging from $50,000 to $1,000,000.

http://www.qp.gov.ab.ca/documents/Acts/E12.cfm?frm_isbn=0779718771

Livestock Diseases Act

The *Livestock Diseases Act* defines livestock as wild animals and birds, whether captive or not, and domestic animals and birds. It does not apply to fish. This Act is aimed at preventing the spread of communicable diseases. It permits the government to quarantine areas and seize and destroy animals in the event of a disease outbreak.

http://www.canlii.org/ab/laws/sta/l-15/20060718/whole.html

Soil Conservation Act

The *Soil Conservation Act* applies to all landowners, and under it, every landowner is required to take appropriate measures to prevent soil loss or deterioration.

http://www.qp.gov.ab.ca/documents/Acts/S15.cfm?frm_isbn=0779703677

Water Act

The *Water Act* applies to all water, on or underground, whether in liquid or solid state, and the intent is to support and promote the conservation and management of water.

It also governs access to water, licensing and regulations regarding water development.

http://www3.gov.ab.ca/env/water/Legislation/WaterAct.html

Fisheries Act

A federal entity, the *Fisheries Act* applies to all internal waters of Canada inhabited by fish or with the potential to support fish. The Department of Fisheries and Oceans is responsible for the administration of this Act. Offences under the *Fisheries Act* are dealt with very severely and it is important that producers understand what they can and cannot do around water bodies that are considered habitable by fish.

http://laws.justice.gc.ca/en/F-14/index.html

Photo:
Sam Wirzba
and Alberta
Beef
Producers

Summary

Check out information on creating an environmental farm plan for your operation. See http://www.albertaEFP.com (*expires March 31, 2008; stay tuned for what comes out of the next program for Farm Stewardship Funding*)

On page 24 of this section, see the Improved Range Management case study which explains how environmental stewardship has improved the profitability and sustainability of a southern Alberta ranch.

Resources
Beneficial Management Practices: Environmental Manual for Alberta Cow-Calf Producers. *Developed by Alberta Beef Producers, Alberta Agriculture and Food.*

Improved Range Management

Good for the Land, Good for the Cattle, Good for the Pocketbook

Brian and Shaunere Lane have been "managing" their cattle and grazing operation for the past ten years.

They have rejuvenated approximately 1,200 acres of Southern Alberta range land through proper riparian area and rotational grazing management. Previously this pasture had been continually grazed as one pasture and was significantly overgrazed.

The Lanes have installed cross-fencing, used gravity waterlines to carry water from springs to offsite water troughs and are fencing off the riparian areas in their pasture. They don't eliminate grazing in the riparian area, but the fencing allows them to control the grazing that occurs along their creek, in order to manage the land and cattle in this productive yet sensitive area.

"The riparian area along the creek will produce about 4,000 lb. of forage per acre," says Shaunere. "We can't afford to completely exclude the cattle from the area; what we do is make use of the forage, and then remove the cattle so it has a chance to recover."

The Lane family's main objective is to make the ranch more productive and more profitable for their commercial and purebred Angus cattle operation, as well as to make it more environmentally sustainable.

The first challenge when they acquired Brown Creek Ranch was to take control of the grazing. Not only were the grasses overgrazed and requiring rest, but the pastures were also being taken over by weeds. They took control, by cutting, hand pulling or using herbicide treatment on the weeds. They also rest pastures, by only grazing once a year, allowing the native grasses to recover.

The Lane's grazing system is meant to limit the winter feeding time as much as possible. A pasture that has good re-growth heading into winter is used as stock-piled grazing the following May. Cows graze on the home ranch until mid June and are then sent to leases and co-op pastures until early October. Calves are pre-sold and weaned in October.

After weaning, cows are pregnancy tested, processed and put on swath grazing until January. Since the Lanes do not own a line of machinery, all cropping requirements for the swath grazing are custom done. Cows are brought home in January to prepare for calving which starts February 1.

Improved pasture management over the past ten years has produced positive results. "The range is more productive and we are able to run more cattle," says Brian. "By better managing our native range and making use of swath grazing, we are producing more pounds of beef while at the same time shortening the winter feeding period."

These efforts and this approach to management earned the Lane's the 2007 National Environmental Stewardship Award presented by the Canadian Cattleman's Association.

Congratulations Brian and Shaunere

Story courtesy of Lee Hart, editor Cattleman's Corner, *Grainnews*
Photo: Sam Wirzba and Alberta Beef Producers

8. Marketing

Marketing

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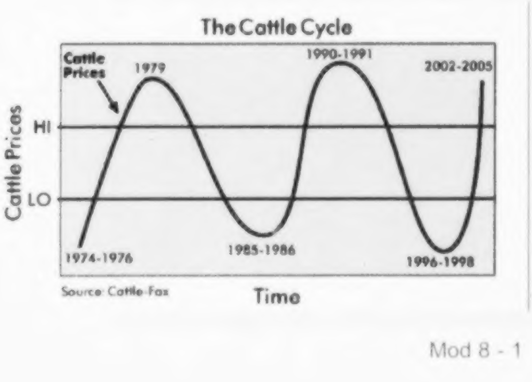
Overview

This section outlines important information related to the beef cattle industry, the cattle production supply chain, the main factors that affect the cattle market (*i.e., cattle prices*) and how the cattle production cycle affects the markets. This is the fundamental information required to make informed decisions about your marketing plan for your cattle operation.

You will also learn about marketing attributes that can be managed and considered when deciding on your operation's production system. These attributes are used to increase the value of your cattle and ultimately make your operation more profitable.



Source: Cattle-Fax

Key Terms

Shrink

Reducing stress on animals is a very critical part of the success for cattle marketing. Weight that is lost on cattle when they are handled, hauled and off feed at the market is called shrink.

More information on **shrink** can be found on the *Managing a Cow-Calf Business* CD.

Price Slide

Price slide relates to the shift in price of similar cattle as they change weight categories. For example, *a 650 lb. steer of the same quality as a 550 lb. steer will be worth less in $/lb.* In marketing, the term price slide is mainly used when price is being negotiated before the actual weight of the animals is known.

Futures Market

Other common terminology and elements related to using the futures market include "hedging" and "basis". Futures marketing can be a very technical topic to cover, outside the scope of this manual, but it is still important to have a basic understanding of how futures markets work, and how they can be used in your marketing plan.

For more information, see the associated links on the *Managing a Cow-Calf Business* CD.

Learning Objectives

The producer will:

- *Be able to build a marketing plan*
- *Gain an understanding of market fundamentals in a free enterprise model*
- *Be introduced to the fundamental drivers of the cattle markets*
- *Learn the options that exist for marketing calves*
- *Learn strategies to achieve the best possible price for calves without being subject to undue risk.*

What is Marketing?

In general, marketing includes all the activities associated with identifying the particular wants and needs of a target market of customers and then going about satisfying those customers better than the competitors. This involves doing market research on customers, analyzing their needs, and then making strategic decisions about product design, pricing, promotion and distribution.

You will find here a general definition of marketing, but most of the description still applies to the cattle industry, with possibly a few adjustments. In general, the cattle market is considered a commodity market, meaning the calves you produce are easily interchangeable with a large number of other calves on the market. That said, there are still things that can be done in order to promote and increase the desirability of your calves.

To be successful in marketing, information is key. There is a large amount of information available for current prices, price expectations, industry trends and cycles, new developments and key factors to watch, etc...

For more details on cattle marketing, see the Reference section on the *Managing a Cow-Calf Business* CD.

The Beef Supply Chain

Cow-Calf Operations

- The cow-calf level is the starting point of cattle production since it is where calves are produced. This is the stage where selection is made regarding genetics, animal types and calving seasons.

Backgrounding

- The backgrounding stage occurs after calves have been weaned from the cows (at 6-9 months of age, 500-650 lb.) and put on a grower ration. Calves spend some or all of their time in a drylot but a large number of the smaller calves are put on grass during the following summer. Backgrounding rations are designed to allow animals to grow while not adding much fat.

Feedlots

- The final stage is the feedlot, where calves are fed in a feedlot with a high energy ration (mostly grain) to gain weight quickly and get fat to improve meat quality before being marketed.

In general, it will take calves from 12-20 months until they are ready for the consumer market. Large calves that are weaned right off the cow and go straight to a feedlot can potentially be finished in 12 months with most finished in the 14-15 month range. Smaller calves, which are backgrounded and then put on grass, and eventually finished in the feedlot, will be around 20 months of age when finished.

Packer/Processor

- Buys cattle from the feedlot for slaughter and processing and then processes the carcasses into boxed beef and sells to the retailers.

Retailers

- Take the boxed beef and sell it to consumers either through grocery stores or the food service industry at restaurants.
- These retailers could be domestic or overseas.

Exchange Rate

The exchange rate is the rate you can trade one currency for another. These rates change day to day, and actually, minute by minute. Since the Canadian agriculture economy is very reliant on importing and exporting goods from other countries, variation in these exchange rates can alter the expected selling price or purchase price of agricultural commodities (fertilizer, grain, cattle, etc.).

For more information on **exchange rates**, see the associated links on the *Managing a Cow-Calf Business* CD.

The Alberta Cattle Industry in 2007

- Alberta is the largest cattle producing province in Canada
- There are approximately 14 million head of cattle and calves in Canada
- Approximately 5.7 million head of these are located in Alberta[1]
- Alberta also accounts for approximately 72 percent of Canada's fed cattle production[2]
- Alberta accounts for approximately 65 percent of the Canadian cattle slaughter.[3]

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[1] Statistics Canada

[2] Canfax

[3] http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/sdd10294

As you move up the beef supply chain, there is increasing consolidation. Starting with cow-calf and backgrounders, the next stage involves feedlots which tend to be large and intense operations focused on fattening cattle as efficiently as possible. There are fewer feedlots, but they handle a large volume of cattle. The next stage is the slaughtering and processing. There are only a few major firms in the slaughter industry, but they are extremely large-scale and tend to handle the majority of the cattle slaughter. Retailers tend to be concentrated as well with a small number of retailers handling a large portion of the market, while the food service industry has a mix of large and small players.

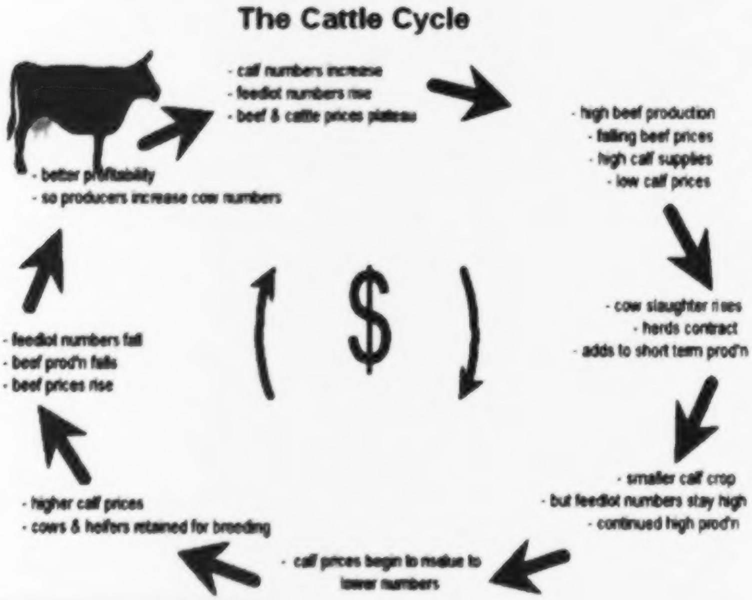
FOR EXAMPLE

There are a large number of cow-calf operations which tend to have relatively small numbers of cattle. Some may keep and feed their calves after weaning while other producers will sell their calves to producers who buy calves for backgrounding.

The Traditional Cattle Cycle

The theory of a typical beef cycle is outlined in this flow chart.

Source: http://www.agrifood.info/review/2002/Griffith.html

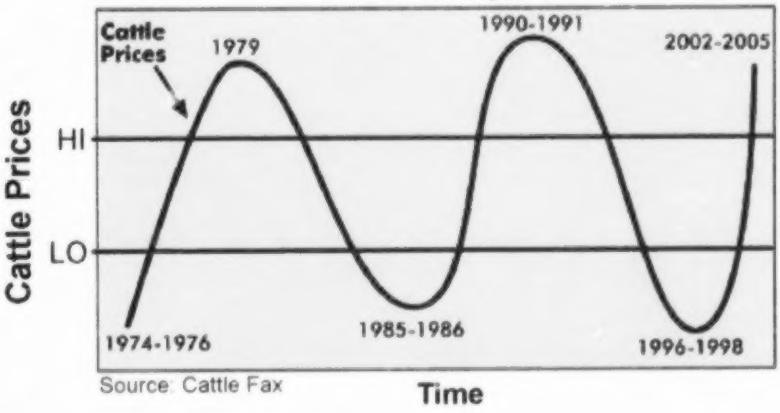

The Cattle Cycle
- calf numbers increase
- feedlot numbers rise
- beef & cattle prices plateau
- high beef production
- falling beef prices
- high calf supplies
- low calf prices
- cow slaughter rises
- herds contract
- adds to short term prod'n
- smaller calf crop
- but feedlot numbers stay high
- continued high prod'n
- calf prices begin to realise to lower numbers
- higher calf prices
- cows & heifers retained for breeding
- feedlot numbers fall
- beef prod'n falls
- beef prices rise
- better profitability
- so producers increase cow numbers
$

The basic principle of the cattle cycle is based on the fact that the cattle industry is very slow to respond to price signals with production. If prices are high and producers want to increase production, they have to hold back heifer calves, breed them, calve them out and feed out the calves to finished weight. This additional supply of beef does not occur for over two years from the time when the decision was made to retain heifers and increase production for high prices. The same result occurs when producers want to decrease production because of the large numbers of calves that have to be fed and slaughtered before a true reduction is realized.

Since the typical cattle cycle lasts 10-12 years, this means the average price peak and trough will occur every 10-12 years as well. This is for a "typical" cattle cycle and if other factors enter the market such as BSE, drought, ethanol (significant impact on feed prices), etc., that may prolong or shorten the cycle by causing an unexpected liquidation or expansion of the cattle herd.

This is important to note because in today's beef industry there tends to be a significant number of other substantial impacts that are affecting the cattle market such as trade disruptions and weather impacts; therefore, it is important to be aware of other factors in the market that can impact the cattle cycle before making decisions based solely on the historical cattle cycle. These are often described as the economic indicators that are impacting the market.

The Cattle Cycle



Source: Cattle Fax

Another Perspective on the Traditional Cattle Cycle

Traditionally, the cattle cycle was related to the rise and fall of cattle numbers due to local or regional/national events. With the increase in world trade, the cattle cycle has become much less reliant on national cattle/beef production because of the wide variety of factors that now influence local markets.

With the ease of trade and the effect of foreign policies (blocking trade, or domestic policies affecting feed prices), the cattle cycle has become much less predictable and less abrupt. Ease of imports and exports decrease price fluctuations in the cattle market because excess production can be exported, and imports are available in times of shortages. Since markets continually adjust, the ability to manage your production and marketing decisions based on the cattle cycle is becoming less and less reliable.

Key Points

- Monitor the stage of the cattle cycle through herd expansion or contraction
- Monitor US market prices
- Monitor changes in the value of the Canadian dollar
- Monitor changes in the basis
- All of these market indicators can be found through canfax at http://www.canfax.ca/

Market Drivers

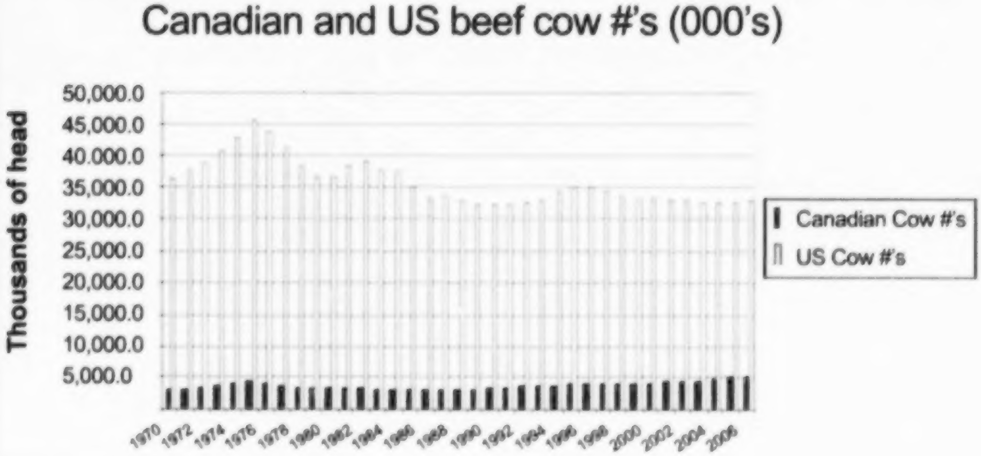
Because of the proximity of Canada to the US and the large amount of trade between the two countries, it is very difficult to talk about the Canadian market without discussing the US market. Since the US market has approximately seven times the number of cattle that Canada does, the Canadian market is a shadow of the US market.

The Canadian and US markets are very closely linked; therefore, when the price changes in the US market, the same effect is seen in Canada assuming there are no significant trade disruptions such as a border closure.

US and Canadian cow numbers are shown in the following chart. From looking at the chart, it is easy to see why the US market dominates Canadian markets.

Canadian Calf Prices = (US price/CDN Dollar exchange rate) minus basis (transportation costs, inspection, documentation cost and local supply/demand conditions)

In simple terms, the Canadian price for cattle is determined by taking the US price, adjusting for the value of the Canadian dollar, minus transportation and logistic costs of transporting to the US destination, and assuming same type of cattle (sex, weight, quality).



Marketing Fundamentals

The cattle market for feeder cattle is considered to operate under the conditions of "perfect competition" where the laws of supply and demand eventually determine an equilibrium price. Under the conditions of perfect competition, there is free entry and exit from the industry. Therefore anyone is free to produce and sell calves and anyone can buy calves. Essentially, there is potentially an unlimited number of buyers for calves.

With perfect competition, if cattle feeders are buying calves and are making above normal profits, other buyers will enter the market because of the potential profits and eventually increase the price of calves through increased demand. The opposite happens if prices are too high and cattle feeders are losing money.

Supply and Demand

The cattle market operates under the same principles as any other market–the law of supply and demand. Price is ultimately a result of these two factors, but there are a significant number of variables that affect supply and demand. Both supply and demand are not only related to domestic variables but international variables and policies as well.

Cattle Supply–in simplistic terms, the more cattle and beef on the market, the lower prices will be, assuming all other factors remain constant. Supply of cattle is a result of the changes in the cow herd and resulting calf crop. Calf crop production responses can be related to:

- Feed Costs

Higher feed costs mean poorer returns; therefore, reduced supply and vice versa for a decrease in prices.

- Grazing Conditions

Grazing conditions also affect cattle supply since a lack of grass can cause herd reductions, and/or less heifer retention, which may increase the supply of slaughter cattle in the short term, and decrease the supply in the future, because of the cow-herd reduction. The opposite holds true when grazing conditions are above normal.

FOR EXAMPLE

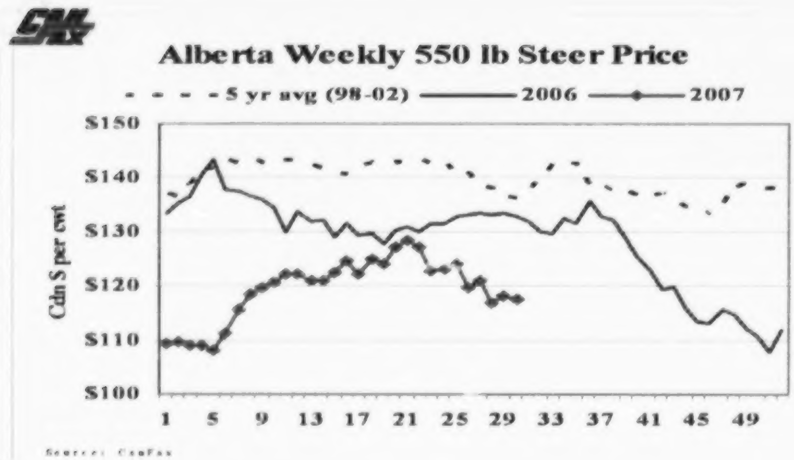
It is also important to remember our earlier discussions on the cattle cycle, that the number of slaughter animals (beef supply) may be the result of events that occurred one or two years earlier (for example, high cattle prices, and the retention of additional breeding females).

- Price Signals

Higher prices will eventually lead to an increase in production as producers increase production to increase profit and vice versa for expected lower prices.

- Seasonal Production Patterns

Since the majority of calves are born in the spring, there tends to be a bulge in the supply chain as these cattle move through the supply chain. This does create opportunity for raising and marketing calves in times when supply is lower.



The adjacent graph shows the seasonality of prices for feeder calves. There has been some variance from the past over the last couple of years, but prices still tend to be higher earlier in the year with a decline into the fall and the fall cattle run.

The fall run tends to start in September with most calves being sold in October when they come off pasture. Traditionally, calf prices do tend to increase slightly just before year end when the supply of calves begins to drop.

- Past Profitability in the Cow-Calf Sector

Producers tend to be more willing to invest into the industry if they have experienced good profitability, leading to future supply increases.

Demand

The market for feeder calves is a derived demand from cattle feeding, grazing and backgrounding operations. This demand and the resulting price for feeder calves will be determined by the expected selling price of the finished calves minus the cost to raise the calf for the finished cattle market.

Effect of Feeding Costs on Calf Prices

If the purchase price and selling price of cattle is held constant, while costs of production for feedlots is increasing/decreasing, it will mean a feedlot will be less/ more profitable. If feed costs increase, and other factors remain the same, feedlots will have to pay less for calves for their operations to be profitable.

There are a variety of costs for a feedlot; therefore, as feedlot costs increase, this increase is passed on to cow-calf producers through lower prices. If feedlot costs decrease and subsequent profits increase, more buyers enter the market which forces prices higher.

Common costs for a feedlot are:

- Feed costs
- Interest rates
- Operating costs (often referred to as yardage).

Expected Price for Slaughter Calves

The expected price for feedlot calves is futures price minus basis. As discussed earlier, most of the expected prices for calves will be determined from the US market.

Once feedlot producers have a target selling price for their calves, they will calculate their cost of production to raise a calf for their desired target market.

With the selling price and cost of production information, feedlot producers will calculate the price they can pay for calves. Once all of the buyers have calculated these costs for themselves, the industry will find an equilibrium price that calves will sell for. Since there is a lot of competition for feeder calves, if not enough buyers can make a profit at the market price, prices will fall. If there is too much profit in buying feeder calves, the price of feeder calves will rise.

Feeder price formula

Combining the target slaughter price and cost of gain in a simple formula summarizes how demand affects feeder cattle prices:

$$\mathbf{FP} = \mathbf{SPe} + \frac{(\mathbf{SW}-\mathbf{FW})}{\mathbf{FW}}(\mathbf{SPe}-\mathbf{CG})$$

Where:

FP = feeder price at a given weight ($/cwt)

SPe = slaughter price expectation: finishing industry's average expectation of price of slaughter steers or heifers at the time when slaughter weight is reached ($/cwt)

SW = slaughter weight of fed cattle (lb.)

FW = feeder weight (lb.)

CG = finishing industry's average cost of gain, excluding cost of feeders ($/cwt)

Consider a case where the slaughter price expectation is $84/cwt, the average cost of gain in the industry is $67/cwt, and the average slaughter weight is 1250 lb. According to the feeder price formula, the price for a 600 lb. steer calf could be predicted as follows:

$$\$84 + \frac{(1250-600)}{600} \times (\$84-\$67) = \$102.40/\text{cwt}$$

From the formula it is evident how the selling price of calves and the cost of gain will directly impact the price of feeder calves. The higher the price of slaughter cattle, the more feeder cattle will be worth, but the higher the cost of gain, the lower the value of feeder calves.

http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/sis10943

Key Points

- Effect of supply of cattle on prices
- Delayed supply response due to cattle production
- Derived demand for cattle
- Feed costs
- Consumer demand
- Other demand factors.

In all cases, feedlots will determine a breakeven price and bid for the calves to achieve a breakeven profit or more. Because of the nature of the free enterprise model, the selling price of calves is very near to the breakeven cost for the feedlots.

As we continue up the supply chain, the price of slaughter cattle is derived demand from what the selling price of beef is to consumers, minus processing costs.

The price of beef will be affected by:

- Exports/imports
- Strong export market (prices increase as a result of increased international demand)
- Lots of imports (prices drop as a result of increase in supply)
- Consumer demand (consumer income and general consumer trends)
- Consumer willingness to buy beef (prices increase as beef appears more appealing)
- Competing meats (if the price of chicken or pork decreases, the price of beef has to decrease in order to compete with these other meats).

See the following flow chart explaining cattle supply and demand.

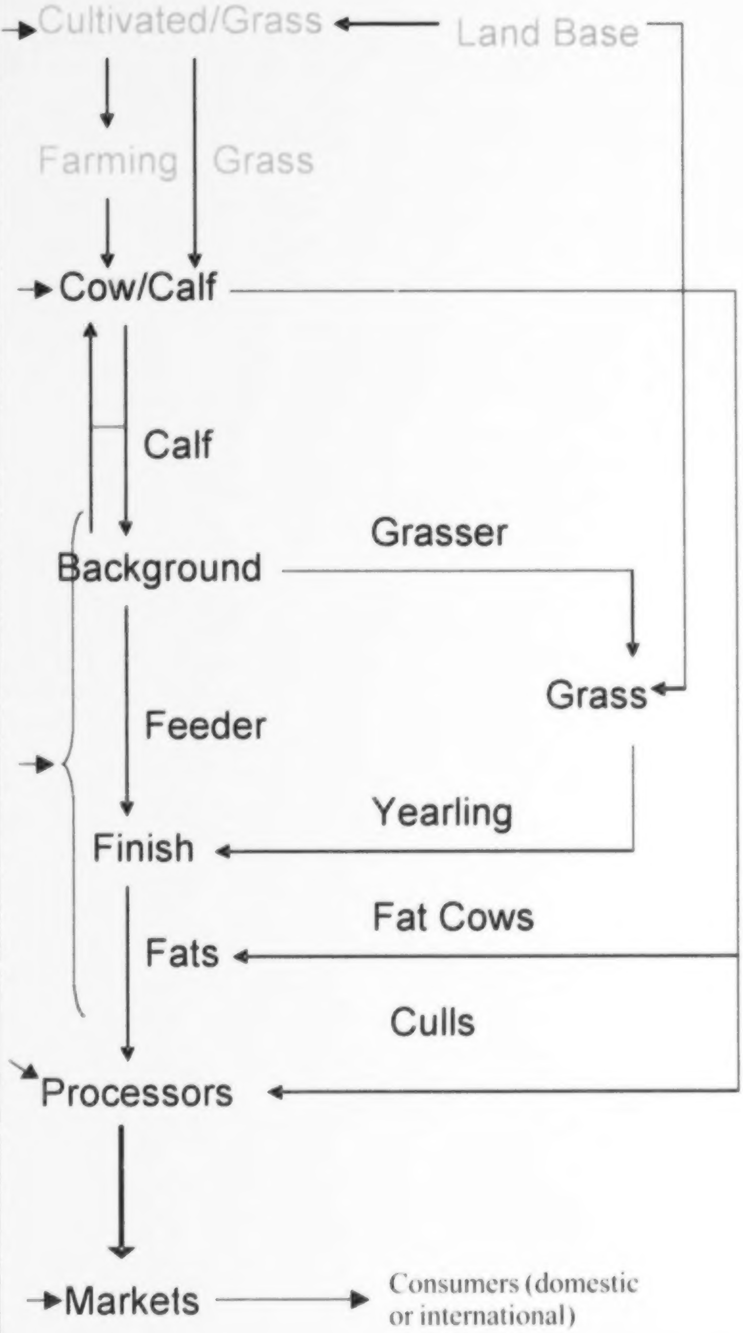
Basic production blocks for operation–labor, management, land and cattle

Short-term: Short-term production based on current profitability price expectations (depending on cattle cycle, feed costs and grazing conditions); poorer profitability or lower price expectations leads to higher cull rates and lower heifer retention.
Long-term: Cow-calf producers' production decisions based on COP versus selling price. Long-term price of cattle sales must be greater than cost of production.

Feeding Industry–margin players (selling price - costs = purchase price of calves). Ultimately, the final selling price of finished cattle, minus production costs to raise cattle for slaughter determines the value of calves. Final value of calves depends on consumer demand, international markets and exchange rates. Cost of production is the cost of feed/grass, interest rates and operating costs.

Processors are margin players as well. Price paid for slaughter cattle is processed animal product value minus production costs.

Price determined by consumer demand–a function of price of competing meats (chicken and pork), consumer wealth and consumption trends (beef's image as a healthy and high quality product). Price is also a function of the supply of beef from past production decisions in supply chain as well as imports.


Cultivated/Grass
Land Base
Farming
Grass
Cow/Calf
Calf
Background
Grasser
Grass
Feeder
Yearling
Finish
Fat Cows
Fats
Culls
Processors
Markets
Consumers (domestic or international)

International demand depends on trade rules, exchange rates and consumer willingness to buy beef.

Required Documentation for Marketing Animals

As of December 31, 2007, all cattle leaving their herd of origin are required to have a CCIA (*Canadian Cattle Identification Agency*) approved RFID (*Radio Frequency Identification*) tag (except cull cows with dangle tags–these tags will be honored for the life of the tag in the cow).

All cattle must be tagged prior to leaving their herd of origin including those cattle going to community pasture, exhibition sites and vet clinics, as well as ones being sold or fed at other locations.

(http://www.canadaid.ca/About/#Getting_Tag)

When selling livestock, it is required by law to provide the buyer with a bill of sale.

The bill of sale must show:

- The date of the sale
- The proper name of the buyer and seller
- The number of livestock sold
- Color of the livestock
- The kind of livestock
- A description of the livestock including brands and other marks on each head.

Steer versus Heifer Prices

If you attend a feeder calf sale or review market information for feeder cattle, it is very evident there is a difference in price between heifers and steers of the same weight and quality. The reason for these differences has to do with the economics of feeding heifers versus steers for slaughter. Heifers tend to have a lower feed conversion than steers, meaning that they require more feed in order to gain the same amount of weight as steers. Also, when heifers are sold for slaughter, they have a slightly lower dressing percentage than steers (dressing percentage is the percentage of the carcass weight of an animal compared to the live weight).

Heifers are also smaller when they are slaughtered; therefore, the cost/lb. of beef is greater to process because the cost to slaughter steers and heifers is virtually the same, but there is less end product from the heifers. These differences in costs and returns on heifers are passed down the supply chain to the cow-calf producer, and the result is the lower price for heifers versus steers.

The price gap between steers and heifers will vary depending on size of the cattle and the demand for heifers. Depending on the stage of the cycle, such as during expansion, there may not be as wide a spread between steers and heifers since there are fewer heifers coming to market and an increased demand from other producers looking for heifers. Also, as heifers get heavier, there is less of a discount in $/lb. because some of the costs have already been realized by the seller and because a change in the $/lb. price has an increased change in the $/hd value as the number of pounds increase. The heifer to steer price spread can range from $0.20/lb. for small heifers when in low demand compared to $0.05/lb. for larger heifers when in higher demand.

Marketing Attributes

The following attributes are used by cattle producers to promote added value to prospective buyers.

Age Verified

Age verification of cattle is managed by the CCIA. As discussed earlier, all cattle leaving their herd of origin require a RFID tag. Given the database of tag numbers available, the CCIA is allowing producers to submit date of birth information with each individual tag or with a date for a group of tags. Since there are certain markets that require age verified cattle, or pay a premium for age verified beef, there are buyers willing to pay a premium to buy cattle that are age verified. Age verification can be done on line by visiting the CCIA website.

http://www.canadaid.com/

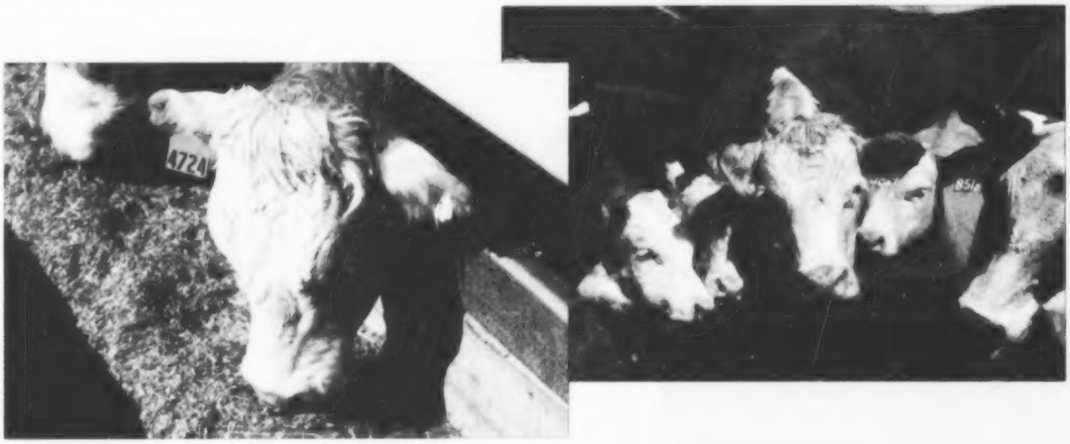
If you are selling your cattle through a licensed livestock auction, a manifest will suffice for a bill of sale. New manifest books do have bills of sale in the back for private sales. Manifests are also required when selling cattle or transporting cattle; a manifest is required to be completed and signed by the cattle owner or the cattle owner's agent when cattle are transported to pasture, exhibition, market and any new location, except when being transported to or from the vet.

Cattle that are being sold or moved across borders are required to be brand inspected. For further information,you can contact the Livestock Inspection Services.

http://www.lis-alberta.com/

Herd Health Pre-conditioning

Pre-conditioning calves is often done by cow-calf producers to ease the transition of calves from suckling calves to relocation to a drylot. As a result, calves become more valuable through decreased risk and higher performance.



Pre-conditioning generally involves dehorning, castration, parasite control, vaccination and weaning. In order to sell pre-conditioned calves, all of the above operations should be completed before the animals are ready for sale. For weaning, it is expected the calves have been weaned for a period of time to allow the calves to adjust from suckling to eating properly on a complete dry diet.

FOR EXAMPLE

Dehorning and castrating very young calves (2 days to 3 weeks) is proven to be much less stressful and have fewer implications on calf performance versus doing it when they are 6-12 months old. Therefore, this is best done by the cow-calf producer.

The reason it is beneficial for cow-calf producers to do the pre-conditioning steps versus feeding operations is that there are steps that can be done at more optimal times.

Also at weaning time, it may be less stressful to wean calves in a familiar area (home facilities) with familiar people and feeding systems rather than going to new places with different people and feeding systems. All of the changes occurring at once increase the stress even more–particularly right after calves are removed from their mothers.

Cow-calf producers should consider both positive and negative implications. The goal of the cow-calf operator is to increase returns by increasing the value of his calves. This can be done in two ways:

1) Add weight to the calves and increase their value after the weaning stage

2) Increase the value of their calf price $/lb. because there will be less risk associated with buying the calves and because they will have better performance. The concerns for cow-calf producers are that they are incurring more risk because of potential death loss and increased cost without a guaranteed premium unless it has been pre-negotiated before the calves are marketed.

Genetics and Reputation

Genetics and reputation relates to the value the buyers see in your calves because your animals have the desired characteristics. Some cattle feeders want different types of animals. If you produce calves that have the genetics or you have the reputation of producing healthy calves that are efficient for the feedlot (gain weight well and have good carcass characteristics), they will bring a higher price than average calves, or calves with limited information. Uniformity of your calf crop also provides a potential price premium as it is a reflection of good genetics and management. Reputation also ties into the discussion on herd-health and pre-conditioning in that buyers know they are getting healthy cattle that are well managed.

Even if you sell your calves through an auction market, it is a good practice to get to know the buyers so you can tell them about the calves in your program and possibly follow up on how your cattle performed after they were sold. Often, buyers will have useful information regarding the cattle markets and can be an excellent resource.

FOR EXAMPLE

Will you wean large calves early in the fall destined to be slaughtered the next spring or wean somewhat smaller calves later in the fall for the backgrounding and grass cattle market? This will also depend on the economics of your operation, labor requirements, etc. which may play a factor for your management system.

Producing What Is in Demand

There is a very wide variation in the type of cattle that exist. Therefore, as demands change, it is important to be aware of the types of cattle that are in demand as well as seasonality factors. When deciding on the type of cattle and the production system, consider your marketing plan.

Decisions regarding the breed of cattle, calving season, and type and size of cattle within the breed chosen will impact the market for your calves.

Laura's Lean Beef Program

"Laura's Lean Beef" is a branded beef program.This beef is marketed to target consumers looking for leaner beef produced with healthy feedstuffs and no added growth hormones. The beef is marketed this way in order to achieve a premium. Likewise, producers involved in the program who raise the specific breeds of cattle in the program and raise their cattle under the required specifications receive a premium for their calves. Laura's Lean Beef program was started in the US and now sells in Canada. There are also beef producers in Canada who are in the program.

Further information on Laura's Lean Beef program, production guidelines, and enrollment can be found on their website at: http://www.laurasleanbeef.com/

Laura's Lean Beef program is just one example of several branded beef programs that exist in the industry today. There are also more local programs in Alberta as well. The key with any of these programs is to determine if they fit in with the goals of your operation. It's also helpful to ensure that the benefits of entering into the program outweigh the costs of meeting the requirements, as well as costs from potential production losses due to being limited on the types of production methods that can be used.

Selling Breeding Stock

Selling breeding stock can be divided into two channels. There are the *full seedstock producers* who raise cattle for selling herd sires and breeding females to other cattle producers and there are also *commercial cattle producers* who focus on selling their heifers for breeding stock to other commercial cattle producers rather than selling them into the feeder market. To get into these markets, many of the topics already discussed are very important.

Proper herd health and a good reputation, as well as having cattle with the characteristics and qualities that are in demand now and into the future, since they will be expected to have a long reproductive life, is critical. For some producers, taking the market price or trying to achieve small premiums out of the market for higher quality cattle may not be sufficient for them to achieve the returns they desire, or the goals for their operation.

Value Chains

Opportunities do exist for producers to join a value chain which is a group of producers working together to deliver a very specific product to a specific market. Generally there are specifications that must be met in terms of the type of cattle or the methods used for rearing the cattle such as "natural" or "Laura's Lean Beef." It is highly recommended that you do significant research before entering these arrangements so that you know the impacts on your operation as well as the possible risks versus rewards. At times, the added expense or lowered productivity to fit the criteria of these programs offsets any premiums derived.

Marketing Methods

There are a number of different methods for selling cattle.The traditional way is the spot market where sellers bring their calves to the stock yards and cattle are sold by auction. This is still a common means of marketing with auction marts generally located in central locations around Alberta and Western Canada. This method is simple because price discovery is determined by auction on that particular day. It is also somewhat risky as it is difficult to distinguish your calves and difficult to have much influence on the price you receive.

With advances in technology there have been new auctions set up through the internet as well as satellite auctions. These auctions allow sellers to put their calves up for auction right from their farm and to share specific information on their cattle and their program with prospective buyers. Once the auction is complete, sellers have the ability to then decide if they will accept or reject the final bid price. This system has benefits for the cattle since it is lower stress because animals do not have to be hauled and mixed with cattle at the auction mart and stand for a day before being sold. If the sale occurs, these animals will go directly to the buyer's location. One downfall is that you must have a relatively large number of similar calves in order to generate interest from buyers.

Another method of selling your cattle is through a private sale where you find a buyer and negotiate specific terms of a sale. Terms of sale would include terms of weighing, price, date, price slide, etc. Private sales can be difficult because of the lack of ability to determine price (i.e., premium or discount from the market, especially if you are new to cattle marketing) as well as the trustworthiness of the buyer. There are benefits to private sale because it does cut out the middle man; as well, some of these savings can be shared from reduced transportation costs and commission costs, as well as the improvements for the cattle since they do not have to go through the stress at auction marts (less shrink, etc.). You should be comfortable with your knowledge of the cattle markets and cattle values before attempting these types of agreements.

Cost of Production Related to Pricing Requirements/Strategies

A very critical part of any marketing plan is knowing your cost of production (COP). It is impossible to succeed when you have a marketing plan that does not generate a profit.

In the economics section, you learn how to calculate your cost of production and to complete a break-even analysis. Once you have a break-even price, you have some guidance with respect to which marketing plan may or may not work for your operation.

Key Points

- Strategies exist to differentiate your cattle
- Positive attributes assist in higher prices
- Review costs and benefits of pursuing certain attributes
- Know the market.

Other Marketing Considerations

Retained Ownership

Retained ownership relates to maintaining the ownership of your calves higher up the supply chain versus selling them right off the cow at weaning time. This could mean that you keep the calves at the farm for further feeding and growing the cattle or send them somewhere to be custom fed while maintaining ownership. When cattle are custom fed, the cattle owner pays the costs associated with feeding them and is paid when the cattle are eventually sold.

Again it is very important when considering these options to study the economics of the choice, to compare the costs and returns of keeping the cattle and associated risk of death loss, or negative market impacts, versus selling the calves when they leave the farm.

Key Points

- Have a plan for what you are going to do with your calves at weaning time
- Know how you are going to sell your calves and determine a price
- Know your production costs; this is the first step in marketing
- Consider options for selling cull animals.

Marketing Cull Animals

Marketing cull animals is a very important part of a cattle operation. Culls are the cows and bulls that are removed from the breeding herd. They could be culled for many reasons such as disposition, structural unsoundness, infertility, poor productivity, fence breaking tendencies, disease, sickness, etc. Cull rates can be as high as 20 percent of your herd depending on your herd and personal strategic decisions.

There are generally two peak times when cull cattle are marketed: spring and fall. Fall tends to be the time of the most pressure on cull prices because the volume is very high since culls are generally sold at weaning or when they come home from pasture. Selling culls before the rush may be beneficial since you won't have to feed the cattle as long and because you get paid sooner.

Once you have decided that an animal is a cull, it is very important you look at the costs of keeping a cull animal versus selling it as soon as possible. Some of the concepts in the economics section can be applied to the cull cattle marketing decision as well.

Risk

Risk is an important element in all facets of an operation and marketing is no different.

Types of market risk you will face follows.

Price related to:

US market

Changes in the US market will impact the Canadian market.

One method to manage this is through hedging.

Trade Disruptions

Trade disruption can have a significant impact on cattle markets because Alberta exports very large numbers of cattle and beef. This is difficult to manage, but it is a good idea to have a contingency plan in case such a situation arises.

Basis

Basis relates to changes in the relationship between Canadian and US prices and short-term price fluctuations. Forward contracting can reduce your basis risk.

Feed Costs

Unexpected increases in feed costs can significantly affect your profitability and is a common risk. Hedging can reduce your risk.

Transportation

Transportation costs are a risk to your operation as well. It is important to have good trucking outfits available to haul your cattle when needed. Good communication and planning are beneficial.

Number of Buyers

In certain market conditions, there may not be as many buyers because of feed production problems, or market uncertainty.

Volume of Cattle on Offer

Large volumes of cattle being marketed at the same time as yours will have a negative impact on the market price. Try to avoid these seasonally high times.

Shrink

As animals shrink your $/head received can be reduced from poor management and handling at home, at the auction or by a trucker.

Non Payment

Non payment is certainly an issue in private sales but not so likely when selling through a bonded cattle marketing agency.

Key Points

- Know the factors that affect price
- Monitor these factors
- Know your situation, and how much risk you can afford
- Know your cash flow requirements
- Learn about existing risk management strategies.

Each individual has a different attitude regarding risk. Some people may want to reduce their risk as much as possible, maybe due to their personality or due to their financial position. People with a limited cash flow may require a certain amount of revenue to continue operations. Others may not limit their risk because they want the best price possible.

Changes in market prices downward and upward are both types of risk. Therefore, it is important to remember that, in many cases, when you reduce your chance of downward prices, through arrangements such as contracts, you are likely also decreasing your chances of benefiting from price increases.

It is important to know your operation and to know if you are secure if prices drop 10 or 20 percent. What type of measures will you take to protect yourself from a larger decrease in prices or what will you do if prices drop below a certain point? This should always be considered when developing your marketing plan. Another important factor in managing risk is understanding what factors affect cattle prices, such as feed prices, the value of the Canadian dollar, weather, etc.

See the section on hedging and futures markets on the Managing a Cow-Calf Business CD.

Other methods of managing risk mainly revolve around management of your financial position, knowing your costs, cash flow requirements, contingency planning, etc.

Building Your Marketing Plan; Tying It all Together

In order to be successful at marketing and to measure your performance, you need to have a plan. Cow-calf producers generally produce calves that tend to be a commodity, and market prices are dictated to producers. In general this is true, but there are still ways to capitalize on opportunities within the cattle market.

There is a lot more to marketing than just "selling your calves".

As a cow-calf producer, depending on your goals, you can choose what type and size of calves you want to sell, the type of cattle attributes you want to promote, when you will market your calves and the marketing method.

There is a lot more to marketing than just "selling your calves". Also, it is important to know where to find information to assist with your decision and keep up to date on current market signals and trends.

On the following page, there is a checklist with points to consider when formulating your marketing plan.

Marketing checklist

Summary

Checklist

- **What is your production plan?**
  - When will you calve? When will you sell?
  - Are you going to market your calves right off the cow or will you retain ownership of them?
  - Who are you going to target?
  - Are you going to target the grasser market, or the large calves early in the fall for the feedlot?
  - Who are the potential buyers for your calves?
  - Who are your main competitors for your target market?
  - What are the top three attributes you are going to promote in your cattle?
  - Are you just going to sell feeder cattle or possibly breeding stock?

- **What method are you going to use for marketing?**
  - Auction?
  - Private sale?
  - Satellite/electronic sale?

- **Where are you going to find your market information?**

- **How are the basis levels generally at your expected marketing time?**

- **What is your cost of production?**
  - If you sell right at weaning time, how much profit will you make?
  - If you retain ownership, are you going to feed your animals or have them custom fed?
  - With retained ownership, how much extra profit are you expecting to make?
  - Can you afford the risk?

- **What are your cash flow requirements?**

- **How are you going to manage your risk?**
  - Forward contract?
  - Hedge cattle futures?
  - Hedge the Canadian dollar?
  - Lock in feed prices?

9. Finance and Economics

Managing a Cow-Calf Business
An Essential Guide
Finance and Economics

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Overview

In order to determine if your cattle operation is profitable, you have to know how to measure profit. This section introduces you to the basic business principles and terms used in assessing your business's performance. It also explains how to measure performance in terms of profitability, cash flow and cost management.

This section covers some of the tools available to help in managing your cattle operation as well as some technical tools to help you assess the impacts of making a change to your operation. The section also covers the other general financial and economic topics to improve your understanding of business management and to prepare you when dealing with a banker, accountant or other business personnel.

Key Terms

Profitability
Profit is measured as total income minus total costs; profit is also a measure of how much wealth is generated from the operation.

Opportunity Cost
Opportunity cost is generally defined as the cost of losing the best-foregone alternative. For example, *while you put in time on the farm, it may not seem like it is "costing" you anything, but actually it could be costing you $20/hour if you could be at a job that paid $20/hour.* In measuring profit, include the opportunity costs as well.

Liquidity
Liquidity relates to cash flow and the ability for a business to meet its payment obligations.

Solvency
Solvency is how stable your business is overall, that is, do you own more assets than you owe money? If something drastic happens, how difficult will it be for you to meet your debt obligations? Being insolvent has serious consequences and often means an end to a business operation.

Learning Objectives

The producer will:

- *Learn how to measure the profitability of a cattle operation*
- *Understand how all aspects of an operation have an impact on profitability*
- *Develop a process to determine how to improve the business performance of a cattle operation.*

Finance

Finance deals with how businesses raise, allocate and use their money. Financial statements are common tools used to measure a business's financial performance/situation consisting of a balance sheet (net worth statement), income statement and cash flow statement.

Balance Sheet/Net Worth Statement

A balance sheet and net worth statement list all the assets and liabilities (debts) that a business has. A key difference between the two is that a balance sheet values assets at book value (book value = purchase price). For example, land purchased at $250/ac. years ago will still show up on the balance sheet today as an asset worth $250/ac. no matter what it is worth, while for machinery, book value is purchase price minus depreciation.

A net worth statement, on the other hand, will list assets at market value (i.e., what the land is worth if you were to sell it). When reviewing the performance of a business, it is much more accurate to use a net worth statement than a balance sheet because it gives more accurate values. The other difference between a net worth statement and a balance sheet is that on a net worth statement, the last calculation contains **net worth = assets - liabilities**, while a balance sheet has **owner equity = assets - liability**. Note this slight difference in terminology.

Assets and debt are categorized into three areas: current assets/debt, intermediate assets/debt and long-term assets/debt.

- Current assets are assets that can easily be turned into cash at current market value. For example, feeder calves or grain can be easily sold at current market prices.
- Current debt includes payments, excluding term interest, that are due within the next year.
- Intermediate assets are assets that generally have a one to ten year lifespan. *Assets that fall into this category are machinery or breeding stock.*
- Intermediate liabilities are outstanding debts related to the purchase of intermediate assets.
- Long-term assets are assets that have a longer lifespan than ten years, for example, land and buildings.
- Long-term liabilities are outstanding debts against long-term assets.

Finally the net worth statement allows you to calculate your net worth, which is total assets minus total liabilities.

Income Statement

One important thing to determine with an income statement is whether it is based on cash income and expenses, or accrued income and expenses. With accrued income statements, you know that the income and expenses accurately reflect the actual farm performance for the stated time period. With cash income statements, in order to have the income statement reflect the actual income and expenses for the fiscal period, **accrual** adjustments are required such as inventory adjustments, changes in accounts payable, purchased inputs and deferred income.

An income statement measures the profitability of a business, how much income was generated and how much wealth changed over the last year of operation. An income statement starts with a list of the revenue for the farm on top; it then moves down through the different expense categories starting with **variable costs**, and then with **fixed costs**. Net income is total revenue minus total expenses; this is shown prior to income tax deductions.

Leverage

Leverage relates to how much debt you have, compared to the amount of equity you have in your operation. Someone who is highly leveraged has significant debt compared to the amount of assets he or she owns.

Fixed Cost

A fixed cost does not change or vary directly with production or sales amounts and needs to be paid whether or not anything is produced, *for example, interest and taxes.*

Variable Costs

A variable cost changes as you alter the number of production units, *for example, labor or feed.*

Cash versus Accrual Accounting

Cash accounting relates to recording income and expenses when income and expenses are paid. Accrual accounting relates to recording income and expenses to the time period in which they were incurred.

Net Worth

Net worth is your wealth. It is an indication of how much your business is worth, or how much money you would have if you sold all your assets and paid off your debt. This is a very important concept to keep in mind when assessing how well your business is doing, as you will see later.

Other valuable information on the income statement is the **contribution margin**. Contribution margin is the difference between total revenue and variable costs. The contribution margin is the amount that is left over to cover the fixed costs. The contribution margin is useful when comparing different enterprises that are using the same fixed costs, to determine which enterprises are contributing more towards covering those fixed costs.

Cash Flow Statement

Cash flow statements are used to review or project all of the sources and uses of cash for a given fiscal period. Cash flow statements record cash transactions for all aspects of an operation, from regular income and expenses to capital purchases such as land, cash sources such as new loans, as well as the sale or trade of machinery.

- Cash flow statements are critical to short-term feasibility and in planning for periods when cash may be short.
- They may also bring to a producer's attention the fact that certain plans may not be possible in the short term without access to more cash.
- Cash flow statements are especially important for new businesses or when planning a new venture.
- Cash flow statements can be completed monthly, quarterly or annually.

For an example of financial statements, see Appendix A on page 19.

Key Points

- Recognize the difference between a net worth statement and a balance sheet.
- Recognize the difference between accrual versus cash income. *Net income should include all costs, including opportunity costs, such as unpaid labor, etc.*
- Cash flow statements point out if there will be problems covering cash flow to maintain day-to-day operations.

Cash flow statements are critical for any beef operation to determine short-term feasibility and in planning for periods when cash may be short.

Analyzing the Financial Statements

There are two very important strategies for analyzing your financial statements.

Compare your farm to other similar farms.
Compare your current performance to past performance.

A common tool for reviewing your financial statements and business performance is ratio analysis.
Ratio analysis is similar to the production performance measures such as calving percentage, or pounds weaned/ calf, because it compares two or more elements (debt/ equity or current assets/current liabilities).

Using the Income Statement for Management Decisions

See the basic layout of an income statement in Appendix A.

- Contribution Margin: target 65% of gross revenue (On statement = $203,425/$326,500 = 62.3%)
- Overhead and admin.: target 42.8% of gross revenue (On statement = $139,802/$326,500 = 35%-40%)
- Profit = target 15 to 20% of gross revenue (On statement = $63,623/$326,500 = 19.5%)

Using the Net Worth Statement for Management Decisions

The following ratios can be calculated.

Current Ratio

- Measures a business's ability to meet current debt obligations in the upcoming year without significantly disrupting regular operations (also called liquidity)
- Current ratio=current assets/current liabilities
- Optimally you should have $2 of short-term assets for every $1 of current debt. It is acceptable to have $1.5 of current assets for each $1 of current liabilities, but a ratio of 1 to 1 is weak and anything below this can often lead to cash flow difficulties.

Liquidity is commonly measured as:
Working capital = current assets minus current liabilities
Ideally your working capital should be approximately 50 percent of your upcoming year's cash expenses. It can be lower, but the lower it is, the more short-term debt that will be required.

Key Points

- Compare your ratios to other similar businesses.
- Once you have historical data on your own operation, it is very important to compare your most recent ratios to the operation's past ratios.
- When comparing return on investment to other opportunities, it is very important to consider how much risk you are subject to as well, to achieve the expected return on investment (ROI).

Debt Service Ratio

Debt service ratio is another important ratio as it measures the ability of a farm operation to service its debt requirements.

- This ratio is calculated by dividing the total cash available for debt payments in the year divided by total debt and interest payments for the year. For most cattle operations, a ratio of 1.5 for every dollar of payment is adequate; above this is better, but below this can mean cash flow problems.

Debt to Asset Ratio (Solvency)

- This ratio measures a business's ability to meet all of its debt obligations and gives an indication of a business's ability to continue in the event of severe financial adversity.

Debt to Asset Ratio = Total Liabilities/Total Assets

- A business that has less than 25 percent of its asset financed with debt is in a strong position. Farms with 25-40 percent of their assets financed is in the medium range, and 40-60 percent of their assets financed is in a weak range.

Debt/Equity

- Debt to equity is another measure of solvency and is related to the debt to asset ratio because equity = assets - liabilities.
  Again, as this ratio becomes higher, it becomes somewhat more risky because a business has less equity to cover expenses if a disaster strikes.
- The debt/asset and debt/equity ratios also measure a business's leverage. Leverage can be good and bad. If you have a profitable business where your return on total investment is greater than the cost of borrowing, then the additional profit is made from the additional debt financing. If your return on investment is lower than the cost of borrowing, then you have a decrease in profitability.

It is important to remember that in all scenarios, the higher leveraged a business is, the higher risk the business faces from unplanned business disruptions, as well as risk from higher interest rates.

Using Both the Income Statement and Net Worth Statement for Management Decisions

Profitability measures include return on equity (ROE), return on assets (ROA) and return on investment (ROI).

- These are all important measures because they tell you how much profit your operation earns on its investment. For simplicity, a good starting point is comparing the return on investment you can get from a bank. If you know you can get a 5 percent return for money invested at the bank, this is a good starting point to think of what you should expect from your farm.
- Simply, if you sold the farm, the amount of money left over would be your equity. Therefore, comparing ROE to bank returns gives you an idea of how the farm is performing for you. The higher the return, the better.

ROE equals Return on Equity
ROA equals Return on Assets
ROI equals Return on Investment

Return on equity is calculated as:

- (Net Farm Income (NFI)–unpaid labor)/Farm Equity)x100
- Unpaid labor is subtracted from NFI to get a return on the capital invested, so you are not giving away your time.
- Typical ROE for farms is 4-8 percent.

Return on assets (also referred to as return on investment) is calculated as:

- ((NFI+Interest Expense–unpaid labor)/Total Farm Assets)x100
- Again labor expense is subtracted, but interest expense is added back because it is considered part of the return on your investment but was subtracted from NFI.

ROA is generally in the 2-5 percent range.

Key Points

- The first step is to find a bank and account manager with which you are comfortable and who has some background in the beef industry.

- Explore different options because different banks may give you different terms and conditions for your loan.

- Terms and conditions of a loan can often be negotiated (the interest rate, frequency of payments, payback period, loan fees, etc.).

- There are also opportunities for you to hire a mortgage broker who represents you as a lender. This is especially the case when you are in a strong equity position. Mortgage brokers can often secure a lower interest rate than you can negotiate with your bank. Banks will frequently quote you a rate to maintain your loyalty, but they tend not to go beyond that. Consider all available options when seeking a loan.

Debt Financing for Beginners

Financing relates to what funds will be used in order to purchase an asset. Once the desired amount of personal funds have been used, the most common step is to get a loan at a bank.

What are bankers looking for?

- The key criteria a banker looks at when lending money to a potential client is the risk the bank has if the client is unable to repay the loan. Having a strong credit history is the key element in determining your ability to borrow money. People who have a strong history of repaying debt and bills tend to continue to be reliable for repaying debt.

- It is often said that you need money to borrow money. You may not have money, but the bank will look for assets you have to use as "security" on your loan. "Security" in this sense is assets that the bank can have as collateral in case the borrower is unable to repay the loan. If you have lots of "security" for the loans you have, you are a lower risk than someone with less security. Your debt/asset ratio is a way to measure how much risk you may be to a lender.

- Another key part of your success in borrowing funds is a strong relationship with your lender. Communication is key. Being honest, straightforward, and forewarning your lender of any potential issues goes a long way in your ability to negotiate loans. Negotiating your first loan may be difficult but paves the way for future loans you may need.

Planning

Many of the elements discussed in this section are very useful to discuss with your banker. The fact that you have been through a formal planning process, have a set of financial statements and a plan for the future shows commitment, professionalism and thoroughness, all of which will make bankers more at ease and more willing to discuss your proposal.

Measuring Profit Through Enterprise Analysis

Financial statements tend to be an overall picture of your farm–how much debt and equity you have in the farm and how much money the farm made.

Completing an enterprise analysis gives producers a more precise picture of their farm operation to see what is most profitable on the farm and what is less profitable. Enterprise analysis is also a powerful tool to use in measuring how a new management strategy affects the profitability of certain enterprises.

The key component of an enterprise analysis is that all costs are measured at their opportunity cost. For example, if you produce hay on your operation, the cost of feeding the hay to the cattle is the market value of the hay. This same idea is used for all transfers of production from one enterprise to the other. This is also called the "imputed" value of production. To illustrate, calves that are home raised and retained by the producer are transferred to the feeding operation at market price. Pasture grazing is also charged to the cow-calf enterprise at the market value of grazing cows on your pasture (i.e., custom grazing rates) no matter what your costs of production are.

Enterprise analysis is useful because you can now directly track how your operation is performing. If you are profitable on the financial statements, with a mixed operation, it is difficult to see where the profit is coming from. As the example to the right indicates, it is possible that you are actually decreasing your profitability by producing your own feed versus purchasing feed, or possibly the cows were not as profitable as you thought, and the profit is coming from the pasture enterprise. Lastly, it also allows you to focus on management strategies. *Do you quit producing your own feed? How do you make the cow-herd more profitable? What if you focus the productivity on the cow-herd? What impact can investments have? How can you improve profitability/ capitalize on the profitability of your grazing operation?*

In most cattle operations, the farm can be broken into three or four enterprises:

- Cow-calf enterprise
- Forage enterprise
- Pasture enterprise
- Cattle feeding enterprise *(backgrounding and feeding calves)*.

FOR EXAMPLE

If it costs you $40 to produce a tonne of hay, but the market price of hay is $50/tonne then the cost of feeding your cows is still $50/tonne (the opportunity cost of the hay if you were to sell it). Conversely, if it costs you $60 to produce a tonne of hay, the cost of feeding the cows is still $50/tonne. The profit or loss from the hay production will be attributed to the forage enterprise, rather than the cow-herd unfairly gaining or losing from good or bad performance in other areas of the operation.

Profit Points in a Cow-Calf Operation

Enterprise analysis has to be completed for the following operations to determine what works best for your operation:

- Growing feed versus buying (forage feed enterprise)
- Owning versus renting grass (pasture enterprise)
- Possibly running grass cattle instead of cows
- Weaning/backgrounding, potentially finishing (cattle feeding operation)
- Another factor to consider is if you want to own the cattle or lease them with a potential investor. It may or may not help the profitability, but it may be useful for cash flow reasons, or a way to reduce risk. This is similar to owning versus renting pasture.
- Wintering own cows versus getting them custom wintered (issue here is your opportunity, cost of labor, yardage plus feed costs compared to someone else's custom charges).

Cost of Production

In order to complete an enterprise analysis, you need to complete a cost and return analysis for each enterprise. To do this, allocate all of the costs on the farm to the appropriate enterprise. For example, allocate repair and maintenance costs to the appropriate enterprises.

- How much of the repairs are related to the cow-calf operation, for producing feed (if any), for the pasture enterprise and for the cattle feeding (if any).
- Once all of your costs have been allocated and the cost of other home-grown inputs such as feed, grazing and/or calves are calculated at market value, the best way to calculate cost is on a per unit basis (i.e., calculating the cost to produce a $/lb. of calf weaned, or the cost to produce a tonne of silage).
- Unit costing is a valuable tool because it is based on both production and economics. With this methodology, you will realize that you can reduce your costs two ways; either reduce your total costs or increase production.
- Unit costing is also advantageous because it is easier to compare current prices to what you are selling and to determine profitability. For example, if the average market price for your calves in the fall is $1.20/lb. and your cost is $1.25/lb. it is clear that you need to improve in order to be profitable. (Also, for the cow-calf enterprise, it is important to remember that there is some additional revenue generated from the sale of cull animals.)

FOR EXAMPLE

If your costs are held constant, but you change your management system of the cattle herd so that you raise more calves, wean more calves/cow exposed or increase weaning weights, etc., your cost in $/lb. weaned will drop. To illustrate further, if your costs are $100,000 for your cow herd, and you wean 80,000 lb. of calf in the fall, it costs you $100,000/80,000 = $1.25/lb. weaned. But if your costs are $100,000 and you wean 90,000 lb. of calf, your costs are $100,000/90,000 = $1.11/lb. weaned.

An example of a cost & return schedule for a cow-calf operation:

Cattle Sales	**Total**	**$/Cow**	**$/lb. weaned**
Calves	$112,119.00	$659.52	$1.25
Culls	$9,472.50	$55.72	$0.11
Total	$121,591.50	$715.24	$1.36
Expenses			
Cattle Purchases	$16,500.00	$97.06	$0.18
Forage Fed	$20,840.00	$122.59	$0.23
Grain Fed	$7,740.00	$45.53	$0.09
Value of Grazing	$33,990.74	$199.95	$0.38
Vet & Medical	$2,890.00	$17.00	$0.03
Fuel, Oil & Lube	$2,380.00	$14.00	$0.03
Repairs–Machine	$1,275.00	$7.50	$0.01
Repairs–Buildings	$1,530.00	$9.00	$0.02
Utilities and Misc.	$3,400.00	$20.00	$0.04
Custom Work	$2,720.00	$16.00	$0.03
Trucking & Marketing	$2,550.00	$15.00	$0.03
Operating Interest	$255.00	$1.50	$0.00
Paid Labor	$850.00	$5.00	$0.01
Unpaid Labor	$6,800.00	$40.00	$0.08
Total Var. Costs	$103,720.74	$610.12	$1.16
Taxes, Insurance & Water Rates	$326.40	$1.92	$0.00
Build & Equipment Depreciation	$9,690.00	$57.00	$0.11
Paid Capital Interest	$1,190.00	$7.00	$0.01
Total Capital Costs	$11,206.40	$65.92	$0.13
Total Production Costs	$114,927.14	$676.04	$1.28
Net Income	$6,664.36	$39.20	$0.07

This above example is based on:

- 170 cows (inventory held constant from start to end of year)
- Weaning weights of 585 lb. steers and 550 lb. heifers
- Cull rate of 8.8%
- 174 days on feed
- Calf weaning rate of 92.9%

Investment	
Cattle	$185,400
Buildings	40,000
Equipment	65,000
Total Investment	**$290,400**

Break-even output is calculated as:

- Break-even output yield = Total production costs/Output price
- For the example above, we take away the cull sales revenue from the costs because we will assume this is fixed, and the remainder will be the break-even production: ($114,927–$9,472)/1.25/lb. =84,364 lb.=496 lb./cow wintered. This can be achieved either through lower death loss or higher weaning weights.

Note: *This is for lb./cow wintered, not average weaning weight, because not every cow wintered may wean a calf.*

More about break-even and using sensitivity analysis is discussed in the **risk section** on page 16.

Final Assessment

- The final performance check on the enterprise is to determine the return on investment (ROI) of the enterprise. Once all the income is calculated (at market value) and all costs removed, the remainder is profit. The ROI for the enterprise is the profit divided by all investment related to the operation. Investment includes the cattle, proportion of machinery allocated to the cattle, etc.

ROI = ($6,664.36+$1,190)/290,400x100=2.7%

- Unpaid labor was not subtracted since it was already included in the above expenses.
- "$1,190" = paid capital interest

Break-Even Analysis

Break-even analysis calculates the minimum output price or yield in order for an enterprise to cover its cost of production.

Break-even analysis is a useful decision-making tool. Break-even analysis helps you determine what type of enterprises to include in your operation.

For a starting point, the cost of production becomes your break-even price. In the above example, with total costs of $1.28/lb. weaned, the required revenue (break-even) per pound weaned is $1.28.

This is the same for producing your own feed. If it costs $0.03 to produce a pound of hay, this becomes your break-even price. If you can reasonably expect to buy hay for less than this, you may want to consider buying hay. If hay is more expensive, then producing your own hay is beneficial. It is critical that you calculate your cost of production including all costs.

Outlines for creating costs for these different enterprises can be found at: http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all sis10772

Production and Economics

From the previous example you can see how important production performance is to economic performance.

Improving cost of production is more than just reducing costs; it has a lot to do with getting the best "bang for your buck". Given the cow-calf production system you have, there will be production alternatives that can be improved to reduce the cost to wean pounds of calf.

Profitability and cost of production (COP) are more than just managing economic numbers. COP is connected to overall efficiency in all aspects of your operation.

Benchmarking

Benchmarking allows you to compare your economic, production and financial performance. Benchmarking tends to be used in three different ways.

- One is to compare your operation to other similar operations, and to compare yourself to your historical performance. Over a period of time, you can examine how your operation is performing compared to past years.
- Benchmarking is also helpful in identifying your operational strengths and weaknesses, and it allows you to target your efforts in particular areas. It is a very good guide for monitoring your operation's overall performance.
- Benchmarking can be used to compare not only cost of production and elements of cost of production, but it can also be used to compare production, numbers, cull rates, conception rates, death loss, weaning weights, etc. These are all numbers that will directly affect your cost of production performance.

Benchmarks can give you two or three areas to target for improvement.

Key Points

- As a producer, for planning purposes, it is important to consider your costs of production versus benchmarks because there are so many different systems for cattle production.

  For example, some people feed cows 250 days a year, and others may feed less than 100 days; some producers calve in January, others in June. Also, there is a large variance depending on your location (Southern Alberta versus Northern Alberta).

Key Points

- Remember to calculate yardage costs when budgeting for your cattle operations.
- It is also important to remember these costs when deciding on what type of grazing and feeding system will be used, when buying feed, etc. There are also a large number of costs associated with delivering the feed to the cows and maintaining the cows in a drylot setting.
- Records are most useful if they are accurate, consistent and detailed.
- There are a wide variety of tools available for record keeping. Depending on your familiarity with computers, you may be able to build a spreadsheet or use software database programs to track your information.

Yardage and Overhead Costs

A common cost in cattle production is yardage. Yardage includes the daily overhead costs of looking after cattle while they are in a feed yard.

Yardage tends to be a little more difficult to measure because it can be difficult to quantify the expenses that are involved in yardage (facility depreciation, utilities and office expenses, tractor depreciation, farm insurance, fuel, etc.).

Other costs in yardage include custom work and corral cleaning, repairs and maintenance, labor, capital interest, taxes and all other miscellaneous costs. Essentially, yardage tends to be all costs except for feed, bedding, vet, trucking and marketing, and interest for financing purchase of cattle.

Capital Investment Analysis

Assessing an investment over a long time frame (land purchase) or calculating costs for the current period from a large one-time investment (e.g., building a barn) can be difficult.

A common method to analyze investments such as land, or even larger picture investments such as analyzing the entire purchase of a cattle operation, is to use net present value (NPV) analysis.

NPV is based on discounted net cash flows from future operations that are a result of investment made at the current time. In this sense "discounted" means that future dollars are discounted because a dollar in the future is worth less than a dollar today.

For more in-depth information regarding NPV and investment analysis, see the reference section on the *Managing a Cow-Calf Business* CD.

In order to determine current year costs of existing assets, depreciation costs are often used for machinery and buildings. Depreciation rate tends to account for the decrease in value of the machinery or buildings from use and aging. Common depreciation rates for machinery tend to be 7-10 percent per year and 4-5 percent per year for buildings (depending on the age and type). These rates may vary depending on the type of machinery you have, its age and the length of time you expect to keep it.

FOR EXAMPLE

If your tractor is worth $50,000 at the start of the year and you use a 7 percent depreciation rate, that works out to a depreciation cost of $3,500/year for the tractor. For the cow-calf operation, if the tractor is used half the time for the cows, and the other half for calves or forage production, then only $1,750 would be the cost to the cow herd for the tractor.

Basic Accounting Practices and Bookkeeping

Farm businesses have advantages in terms of accounting because they can report their income tax on a cash basis. This means income and expenses are recorded when they are paid rather than in the fiscal period they are incurred. This creates some advantages for farmers because they can easily transfer income or expenses between different fiscal periods by deferring cheques, or pre-buying inputs in order to manage their income tax.

Another key part of business management and measuring performance is related to record keeping. Without quality information, it is difficult to be confident in the results of your analysis. Record keeping for feed production and usage, grazing production and cattle production, as well as associated costs, are the first key steps in order to measure your business's performance.

- Since computer software is continually upgraded and improved, some links in the reference section on the *Managing a Cow Calf Business* CD are being provided which include topics on software program information. You may also want to talk to your accountant, banker or other industry players to find out about the latest bookkeeping software that will suit your operation.

Risk

Risk is related to making decisions when outcomes are uncertain such as making decisions when the selling price of calves, death loss or average weaning weight is unknown.

There are two types of risk: **positive risk** (higher prices, better production, more profit) and **negative risk** (lower prices, poor production, lower profit). Most individuals are concerned about negative risk and decreasing the potential losses due to negative risk.

Risk can be a result of a variety of aspects of your operation. These tend to be grouped into internal risks and external risks.

Risk Management

Generally risk management revolves around events that have a significant negative impact and a reasonable probability of happening.

There are management strategies for both internal and external risks.

The most common type of risk management is insurance such as fire insurance, disability insurance and crop insurance.

There is a premium cost for insurance, but you have to set a limit to the losses that can be incurred. The premium cost will reduce profit if no insurance claims are made. In cattle operations, production insurance can be bought for cattle death loss and production losses, but often the cost of insurance may be prohibitive. It is important to weigh the cost of the premium versus the risk of loss.

Production risk management may be as simple as proper animal care and nutrition to protect from death loss of cows and calves and to obtain proper animal performance. See the nutrition and reproduction sections for proper management of these aspects of your operation.

Internal and External Risk

Internal risks tend to include:

Production risk
  Large death loss, poor cattle performance, etc.

Human resource risk
  Human error, poor performance, injury and liability

Legal and social risk
  Being sued, and/or contracts not honored

External risks include:

Environmental risks
  Natural disasters

Market risk
  Poor prices, large price drops, increased input costs such as feed, etc.

Consumer risk
  Changes in consumer opinions of beef, diets, foreign consumers, etc.

Financial
  Higher interest rates resulting in increased debt payments and inability to increase credit

Political risk
  Due to changing international policies, trade rule changes, or domestic policies which affect the cattle industry, such as subsidies for ethanol production

As discussed in the marketing section, a common risk management strategy is hedging, which includes hedging on the futures for cattle or grain futures, or hedging the Canadian dollar. Refer to the marketing section for more information on hedging.

Financial risk management may be managed through hedging, but it also relates to the structure of your business.

- *How much debt do you have?*
- *Do you have floating interest rates or fixed interest rates?*

You may have a mix of loans, but it is important to know how much fluctuation your operation can bear without having a significant impact on planned operations. Renting land versus purchasing land will likely have reduced risk in the short run.

Lastly, there may be some risks that you have to accept. Insurance may not exist or be too prohibitive in order to have a profitable operation. Generally these risks are very likely to have a very small probability of happening, or are not detrimental to the operation. *The key is to be aware and to have a contingency plan if the worst case scenario were to occur.*

Sensitivity Analysis

One tool to measure the risks your operation face is to complete a sensitivity analysis. This involves finding the main variables that will affect profitability or cash flow (generally, price of calves, cost of feed, expected production), and completing "what if" scenarios for these variables.

This also allows you to measure your business's ability to withstand decreases in profitability and cash flow from expected outcomes.

FOR EXAMPLE

If calf prices were $1.05/lb. at selling time, what will my profitability or cash flow be? What if I only wean 500 lb. calves, or what if feed prices increase 15 percent, what will be the effect? Answering these questions allows you to prepare if it appears these conditions may arise.

Summary

Production economics is the combination of production and financial information. As a variable is altered in one part of the operation, it will have an impact on the profitability.

Financial statements give a broad picture of how your operation is performing. Is it profitable or not? Does it generate enough cash flow to continue operating?

To get a better idea of the specific elements of your operation use enterprise analysis. Enterprise analysis breaks down the operation into profit centers and by analyzing each profit center, decisions can be made regarding how the operation will be set up. By doing enterprise analysis, a producer can determine what the best approach will be when it comes to the following decisions:

- Owning versus renting land
- Producing versus buying feed
- Buying versus leasing cows
- Expanding cow herd versus running grass cattle
- Feeding calves versus selling calves at weaning.

If the cow-calf operation does not look profitable, and that is still the desired direction of the operation, you should explore different production alternatives. As well, you will have to take an in-depth look at what cost factors may be out of line with existing benchmarks.

From a systems approach regarding the cattle operation, some aspects to consider and their impact on cost and returns would be:

- Cattle ownership versus lease cows
- Extended grazing on extensive land base versus longer winter feeding season
- Early calving season with generally higher feed costs, and more investment in facilities, with increased revenue versus late calving season and possibly lower calf values.
- Impacts on yardage costs.

The operation may require different marketing alternatives, and/or looking at retained ownership strategies.

The financial statements show if the farming operation is profitable or not, but the enterprise analysis determines exactly where profits and losses are being incurred.

Appendix A

Joe Farmer
Financial Forecast

For the year ended December 31, xxxx
(Unaudited - See Notice to Reader)

Notice to Reader

To complile a Financial Forecast

We have compiled the financial forcast for Joe Farmer consisting of forecasted statements of net worth as at December 31, xxxx, and the related forecasted statements of income and cash flows for the year then ended, using assumptions with an effective date of April 26, xxxx, and other information provided by management. Our engagement was performed in accordance with the applicable professional guidance on compilation of a financial forecast issued by the Canadian Institute of Chartered Accountants.

A compilation is limited to presenting, in the form of a financial forecast, information provided by manangment and does not include evaluating the support for the assumptions, or other information underlying the forecast. Accordingly, we do not express an opinion or any other form of assurance on the financial forecast or assumptions. Further, since this financial forecast is based on assumptions regarding future events, actual results will vary from the information presented and the variations may be material. We do not assume responsibility to update this communication for events and circumstances occurring after the date of this communication.

This communication is intended solely to assess the financial performance of the current operation and is only to be referred to or distributed to Joe Farmer.

April 26, xxxx
Red Deer, AB

Meyers Norris Penny LLP
Chartered Accountants

102, 4922 - 53 St. Red Deer, Alberta T4N 2E9, Phone: (403) 346-8878

Joe Farmer
Forecasted Net Worth Statement

As at December 31, xxxx

(Unaudited - See Notice to Reader)

	xxxx + 1	*xxxx*
Assets		
Current		
Cash	**105,834**	120,119
Prepaid expenses	**12,000**	12,000
Accounts receivable	**0**	30,000
Crop inventory	**15,000**	15,000
Feed and supplies	**85,000**	85,000
Market livestock	**47,000**	37,000
	264,834	299,119
Property, Plant and Equipment		
Breeding livestock	**280,000**	280,000
Building	**319,595**	329,000
Farm machinery	**460,071**	494,700
Land	**1,105,000**	1,105,000
Other long-term assets	**204,042**	204,042
	2,633,542	2,711,861
Liabilities		
Current		
Bank indebtedness	**0**	24,764
Accounts payable and accruals	**3,469**	3,825
Current portion of long-term debt	**74,300**	71,822
	77,769	100,411
Long-term debt	**445,700**	520,000
	523,469	620,411
Owners' Equity	**2,110,073**	2,091,450
	2,633,542	2,711,861

Joe Farmer

Forecasted Income Statement

For the year ended December 31, xxxx

(Unaudited - See Notice to Reader)

	Base Plan
Revenue	
Crop sales	**2,500**
Livestock sales	**314,000**
	316,500
Inventory increase (decrease)	**10,000**
	326,500
Production expenses	
Chemical	**6,000**
Feed	**14,000**
Fertilizer	**12,000**
Livestock purchases	**22,000**
Seed	**1,200**
Veterinary	**6,200**
	61,400
Gross margin	265,100
Operating expenses	
Crop insurance	**4,000**
Custom work	**11,000**
Freight and trucking	**4,000**
Fuel	**16,900**
Machinery and building repairs	**15,000**
Marketing commissions	**3,200**
Supplies	**4,575**
Wages (arm's length)	**3,000**
	61,675
Contribution margin	203,425

Continued on next page

Joe Farmer

Forecasted Income Statement

For the year ended December 31, xxxx

(Unaudited - See Notice to Reader)

	Base Plan ***xxxx***
Contribution margin ***(continued from previous page)***	203,425
Administration and overhead expense	
Amortization	**47,789**
Farm insurance	**5,225**
Interest and bank charges	**44,325**
Land rent	**12,000**
Leases	-
Legal and accounting fees	**12,000**
Office and administration	**2,000**
Property tax	**3,263**
Utilities	**11,000**
Vehicle insurance and repair	**2,200**
	139,802
Net Income	**63,623**
Owners' equity, beginning of year	**2,091,450**
Family living expense	**(45,000)**
	-
	-
Owners' equity, end of year	**2,110,073**

Joe Farmer

Statement of Forecasted Cash Flows

For the year ended December 31, xxxx

(Unaudited - See Notice to Reader)

	Base Plan
Cash provided by (used for) the following activities:	
Operating activities	
Net earnings	63,623
Non farm income	0
Family living expense	(45,000)
Amortization	47,789
	66,412
Changes in non cash working capital accounts	
Accounts receivable	30,000
Crop inventory	0
Market livestock inventory	(10,000)
Accounts payable and accruals	(356)
	19,644
Financing activities	
Advances of long-term debt	0
Repayments of long-term debt	(71,822)
	(71,822)
Investing activities	
Proceeds on disposal of property, plant and equipment	0
Purchase of property, plant and equipment	(3,755)
	(3,755)
Increase in cash resources	10,479
Cash resources (deficit), beginning of year	95,355
Cash resources (deficit), end of year	105,834
Cash resources (deficit) are comprised of:	
Cash	105,834
Bank indebtedness	0
	105,834

10. Human Resource
Management

Human Resource Management

Module 10: Table of Contents

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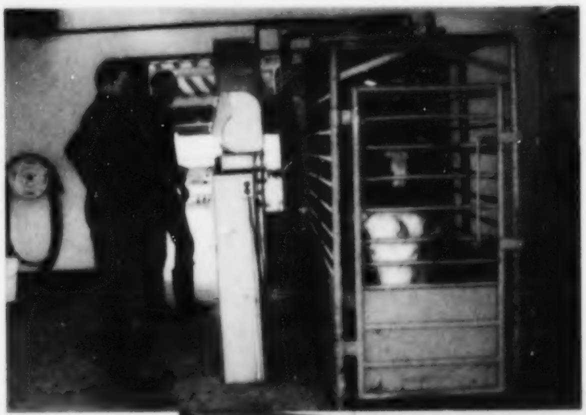

Overview

Human resource management is the strategic and coherent approach to the management of an organization's most valued assets–the people working there who individually and collectively contribute to the achievement of the objectives of the business.[1] This function encompasses a broad range of duties; it oversees the recruitment and retention of employees, total compensation, training and professional development, succession planning, performance management and all the administrative processes that exist to link these areas together. The objective of this section is to provide an overview of the human resource function in a small organization, and to demonstrate the importance of strategically aligning human resource activities with your business objectives. We will do this by explaining employee attraction, recruitment and selection processes, as well as the concepts of retention, total compensation and performance management.

[1] *A Handbook of Human Resource Management Practice*, 10th edition, Armstrong M. (Kogan Page) London 2006.

Overview *cont...*

Finally, we will provide an overview of the employee regulatory environment and other policies and processes that may impact your organization. As an owner-operator, this section will help you understand the importance of establishing the right processes from the start, then maximizing the return on your most valuable asset–your employees–whether you need to hire them today or in the future.

Learning Objectives

The producer will:

- *Learn the components of human resource management*
- *Understand the requirements when hiring an employee*
- *Learn how to manage employees.*

Strategic Human Resources

Historically, human resource management operated at a more administrative level, and tended to be more reactive than proactive. Problems were dealt with as they occurred, usually with *band aid* solutions. Instead of providing reactive HR solutions, this section of the manual will provide a framework that encourages you, the producer, to think strategically when dealing with employees so you can make more effective, proactive decisions.

Strategic human resource management recognizes that business issues, occurring outside of the HR function, can be addressed and solved *through the effective use of people management programs.*[2] For example, knowing that staff morale is directly tied to productivity could be an incentive for a company to organize monthly social events. For a business with one or two employees, it may be as simple as dinner out once a month as a group, with spouses included. Proactively looking for ways to integrate the human element to other areas of the business will lead to an increase in employee productivity and business revenue. As a result, the HR function becomes a strategic part of the organization and directly contributes to the organization's success.

An example of reactive human resource (HR) management would involve a rancher expanding his operation only to find he does not have enough hours in the day to manage all aspects of the business along with the labor required to do the 'work'. The additional stress point is the lack of time to dedicate to training an employee.

As you map out the goals of your cattle operation, you may see areas where additional human resources are required, either as added labor or to fill gaps where your skill set is not sufficient to manage the situation. Part-time help may be all you need, but it is still something that has to be planned.

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[2] Workplace Performance Technologies Ltd. : http:/www.workinfo.com/free/downloads/149.ht

Job Descriptions[3]

A job description provides specific details about the major roles and responsibilities of a position, as well as the technical and behavioral skills required to successfully perform in a given role. Technical competencies are usually learned, either in school or at work, whereas behavioral competencies describe specific behaviors that employees must exhibit to be successful in their role. For example, a technical competency would be knowing where and how to give an intramuscular injection, whereas a behavioral competency would be strong communication skills with other employees.

Having a detailed job description in place also supports the recruitment process. A job description can be used to create an advertisement and interview guide; it can also be used to determine appropriate compensation for a position. Once an employee is in place, the job description provides a clear set of expectations for the employee and can be used by both employee and employer to identify areas where skills can be further developed.

Employee Attraction, Recruitment and Selection

The labor shortage associated with Alberta's economy creates additional challenges for the small business owner, and the risks associated with hiring the wrong employees are costly. The recruitment and hiring process can amount to 30 percent of a position's salary, so care must be taken when selecting your people.[4] The key to finding the right people for your open positions involves creating and following a coherent and structured process.

See the *Managing a Cow-Calf Business* CD for resources to help in sourcing candidates and conducting interviews.

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[3] http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/grc6792?opendocument

[4] Canadian HR Reporter, http://www.tes.net/news1/default.asp?aID=70&language=English

Total Compensation

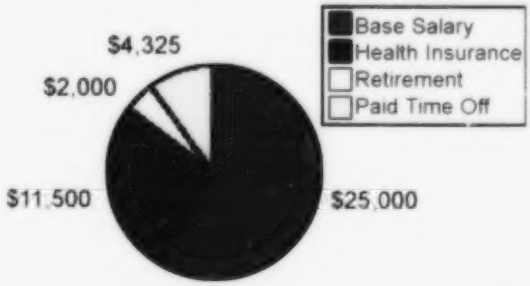
Planning the costs involved with hiring a new staff member go beyond deciding the hourly rate or the annual salary of the new recruit. There are many other costs and requirements that come along with hiring someone. Some costs are mandatory, like payroll deductions and taxes, while some are discretionary costs such as health and dental benefits, bonuses, perks, etc.[5]

Employers have to become increasingly creative to attract and retain employees in a competitive labor market. A fair salary alone is not guaranteed to attract quality employees; it is important that you do your research to understand what your competitors and other players in the industry are offering. The Alberta Wage and Salary Survey can provide useful information on the subject.[6] More importantly, however, you have to know what motivates your employees.

The notion of total compensation refers to the sum of salary and benefits offered to employees, and should be tailored by the employer to reflect the employees' expectations and needs. For example, it would make sense for salespeople to receive part of their compensation in the form of sales commissions, whereas herdsmen may have bonuses based on animal performance, low death loss, etc.

Ultimately, it is the employer's responsibility to determine how the pie will be divided. For example, the graphic below represents an employee earning $25,000 per year. Here the employer contributes another $17,825 per year towards retirement, insurance and paid time off. The employee's total compensation package comes to $42,825 per year.[7]

Administrative Assistant:



Here are a few options, monetary and non-monetary, to consider when developing a total compensation plan.

Benefits
- Group benefits (including health, dental, disability insurance, etc.)
- Retirement savings (pension, RRSP, savings account)
- Pay for time not worked (vacation, holidays, flex days, sick time)
- Payment of professional fees
- Car allowances, mileage, parking.

Pay
- Base salary
- Variable pay (short-term incentives, bonuses, commissions)
- Long-term incentives (profit sharing, equity, stock options)
- Recognition programs
- Alternative rewards (prizes, conferences, travel, services).

Learning and Development
- Personal development programs
- Mentoring and coaching
- Business succession planning
- Performance feedback.

Work Environment
- Work-life balance
- Flexible work arrangements
- Safety and security
- Policies and procedures.

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[5] http://www.cra-arc.gc.ca/tax/business/topics/payroll/menu-e.html

[6] http://www.alis.gov.ab.ca/wageinfo

[7] Total Compensation at Brown University, www.brown.edu/Administration/Human_Resources

Performance Management

Performance management is a continuous process that helps employees develop and reach realistic goals that are tied to business objectives. Although performance management is a continuous process, performance management programs that are formalized and documented ensure that an individual's performance stays on track. The importance of performance management is seen in several studies that confirm that organizations with "performance-focused cultures have significantly higher growth in company revenue, employment, net income and stock prices than did companies with different cultures".[8]

Performance management is tied to an individual's job description. As was discussed earlier, job descriptions describe management's expectations for a given role, and support whether the employee is not meeting, meeting or exceeding these expectations. Performance gaps can be identified and dealt with appropriately when a baseline of expectations exists, and these gaps can be used to identify training and development needs that would help close the gaps. For example, if an employee is required to send out all invoices on the 15th of each month, but is always late in doing so, it might mean that this employee requires more software training that would allow for faster processing.

Goal setting should be an important component of the performance management process, as it allows the employer to monitor the employees' growth and reward positive development. Many times this is accomplished by tying the goal achievement with performance bonuses.[9]

Goals should follow the SMART rules and be:

- **Specific:** A goal has to be clearly defined and include details. A specific goal should be easy to write down and understand.
- **Measurable:** You need a way to measure the progress and some specific criteria that will tell you when you can stop and the goal is achieved.
- **Attainable:** It is important that the goal be ambitious and challenging (in other words, it cannot be too easy), yet realistically achievable.
- **Realistic:** A goal should reflect the true nature of things, be set in reality and relevant to the situation.
- **Timely:** A goal should be time bound in order to avoid procrastination to set in, and sometimes perfection to take over.

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[8] *Human Resource Management*, Mathis, Robert and Jackson, John Harold (Thompson South-Western), 2006.

[9] Time Management Guide, http://www.time-management-guide.com/goal-setting-guidelines.html

Employee Retention

Focusing on employee retention will help your company reduce HR costs by minimizing voluntary staff turnover. Research shows that half of the working population is constantly seeking better work opportunities. Interestingly, 89 percent of the managers believe that employees leave for monetary reasons when in fact a recent survey showed that 88 percent of employees leave for reasons other than money.[10] The importance of being proactive cannot be downplayed. Companies that actively seek their employees' input, and listen to their ideas, suggestions, comments and concerns are more likely to retain their employees than their competitors.

For interesting statistics regarding employee retention and employee turnover, see the reference section on the *Managing a Cow-Calf Business* CD.

Regulatory Compliance

Employers must comply with several sets of rules and regulations governing the recruitment, hiring and termination of their employees. In general, the relevant regulatory structure provides detailed information about the legal or operational requirements of specific aspects of your business. Failure to comply with regulatory requirements may result in exposure to administrative or regulatory penalties from the relevant body.

For more detailed information on specific regulatory topics, see the accompanying *Managing a Cow-Calf Business* CD for resources to help in sourcing candidates and conducting interviews.

It is important to note that farm operations currently (2007) operate under significantly different regulations than other businesses. Farms and ranches were considered home-based businesses when many of the acts were put in place. For employment standards, agricultural based businesses are exempt from standard hours, overtime, etc. Farm operations are also exempt from workers' compensation but can opt to join. The Workers' Compensation Board (WCB) acts to protect employers if an accident or injury occurs at their business. Farm operations are also exempt from the *Occupational Health and Safety Act*. It is important to be aware of these differences and the alternatives that exist for farm operations.

As an employer, your obligations arise from the personal rights of your employees, which are covered under common laws. In most cases, obtaining professional advice before a problem arises will minimize conflicts and business interruptions.

[10] *The 7 Hidden Reasons Employees Leave: How To Recognize The Subtle Signs and Act Before It's Too Late*, Leigh Branham, (AMACOM Publishers), 2005.

Policies and Procedures

A policies and procedures manual should be developed to ensure that each employee understands the rules that govern the business, and that everyone follows the instructions necessary to respect these policies and procedures. For example, a vacation policy would tell the employees the number of vacation days entitlement in their first year, and the related procedure would tell them how to get approval for taking vacation days. It is critical that the policies and procedures meet the minimum statutory employment rules and regulations. For more information, see the HR Management Toolkit Guidelines.[11]

Type of Policy	Examples
General Terms of Employment	• Attendance • Hours of work/overtime • Probationary employee period • Disciplinary action • Termination • Exit interview • Confidentiality/conflict of interest • Vacation schedule • Appearance/dress • Smoking • Harassment
Staffing	• Recruitment and selection • Orientation • Training • Employment of relatives
Compensation	• Salary schedule • Salary adjustment • Pay periods • Direct deposits • Overtime • Incentive plans and bonuses • Employee benefits • Employee expenses
Training and Development	• Approved training courses (internal & external) • Membership dues
Illness and Leaves	• Leave of absence • Compassionate leave • Maternity and paternal leave • Court leave • Statutory holidays
Performance Appraisal	• Conduct of performance appraisals

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[11] http://www.hrcouncil.ca/policies/pg002_e.cfm

Summary

The key element of human resource planning is to proactively determine where some human resource gaps could occur and consider the impacts of changes to your operation on the human resource side of the business. Taking a strategic approach to human resource management ensures that you are fully utilizing your employees, and that they are an asset in building the operation to meet your goals, rather than being viewed as a necessary cost.

In order to have a successful human resource plan:

- Proactively determine where some human resource gaps could occur.
- Create job descriptions to assist in filling these gaps, to act as a guide for hiring the right person, and also to use in performance reviews.
- Know the industry regarding compensation, and create strategies to recruit and retain employees.
- Ensure you account for the total compensation costs when considering hiring an employee.
- Be aware of the required regulations that must be followed to protect yourself from any liability issues that could arise from a situation with your employees.

Managing a Cow-Calf Business

An Essential Guide

Cattle Handling & Feeding Management

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- Number of Cows 3
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Overview

Handling facilities are an important part of any cattle operation. In order to meet your business' production and economic goals, effective handling of cattle and the presence of adequate facilities to manage cattle is critical. Cattle facilities in Alberta can vary significantly depending on location (south versus north), as well as the type of production system used on the operation (calving in February as opposed to May, backgrounding your calves or selling weaned calves off the cow).

There are a wide variety of cattle handling "systems" that exist in blueprint form, and links are provided for such plans. This section focuses on the factors to consider when deciding what kind of buildings and equipment you will need to manage your operation.

This section also covers cattle handling techniques that are valuable for your safety and that of your animals. Proper cattle handling reduces stress on cattle and decreases cattle performance losses.

When planning a cattle facility, producers should consider:

- Calving season
- Number of cows or future size of herd
- Site selection
- Availability of natural protection like treed windbreaks
- Feeding system within feed pens or in fields
- Corrals
- Heifer/older cow pen
- Bull pens
- Calf pens
- Weather protection options
- Wind
- Temperature
- Sorting, handling and loading systems
- Watering systems.

Learning Objectives

The producer will:

- *Learn about the required facilities to look after a cattle herd*
- *Gain techniques for handling cattle*
- *Learn about the winter feeding of cattle and the equipment required.*

Facilities

In general, cattle facilities are the corrals, chutes, feeding systems and buildings used when handling, feeding or housing cattle.

As the industry has evolved, there are a wide variety of systems that have become available to assist producers in sustaining their cattle and achieving desired production targets.

Since the profit margin in a traditional cattle production is shrinking, managing cost of production is becoming increasingly important. Therefore, it is critical that producers make careful decisions on facilities required, and learn how to build them the most economical way.

- Good handling facilities do not need to be expensive but should be well built to withstand pressures from cattle.
- Facilities to protect cattle from bad weather may also be simple; building large and elaborate sheds and barns is unnecessary. Natural shelterbelts or movable slab windbreak fencing can provide protection from wind.

Facility design may also be a function of the type of equipment used to feed cattle, for example, feeding from bale feeders versus bunk feeding.

Calving Season

Calving in the winter versus the summer requires significantly different facilities. Winter calving requires facilities to keep cattle in a confined area, as well as a sheltered spot for calving, possibly a barn or well enclosed shed with some sort of place to warm calves.

Summer calving may need very few facilities; if cows calve on range, an area to catch or work cattle may be necessary depending on your distance from facilities to work with cattle or your ability to rope cattle.

Depending on your calving season, you may want to provide shelters for calves but not build protection for the entire cattle herd. Portable shelters are often preferable as they can be moved around with the herd.

For ideas on facilities, big and small, see the designs listed on links in the *Managing a Cow-Calf Business CD.*

Winter feeding and calving facilities should also be designed to accommodate the flow of cows before and after calving. As your cows get close to calving, transfer them into an easily accessible area which is free of manure buildup. After they have calved, transfer the cows and their young calves to a clean area that will serve as a nursery for the remainder of the winter. Provision of clean facilities for newborn calves will prevent disease.

Site Selection

When selecting a calving area, take advantage of naturally existing features such as bush for windbreaks, shelterbelts, a good feeding or calving area near the main facilities, etc. Characteristics of a suitable calving site include:

- A sloped site that has drainage away from the facilities to allow the pens to dry as quickly as possible
- Available water
- Available utilities
- Convenient road access
- An area that will make best use of the manure.

Number of Cows

Facility design must take into account the size of the herd which will affect:

- Feeding system and feed storage facilities
- Handling facilities, size, sorting pens, etc.
- Bull pens and heifer pens.

Corrals

It is becoming more and more common to have cows on range as long as possible versus feeding them in a confined area all winter. Exercise is good for the cattle and can reduce calving problems. Also, cows on range are spreading their manure naturally versus you having to spread it manually and incurring costs to do so.

Having an area to comfortably hold all the cows is important. If you are winter calving, you will likely need corrals to hold most, if not all, of your cattle for an extended time period. This includes areas to feed them.

The corrals do not have to hold the entire herd in one area. You may have different corrals if you are group feeding the cattle to manage your rations, or if you divide the herd, depending on the stage of calving.

Plan for pens for your bulls as well as calves or replacement heifers you will be feeding.

Locate bull pens away from the cows or heifers, as bulls can damage facilities when females are coming into heat.

Dimensions for facilities can be found in the reference section on the *Managing a Cow-Calf Business* CD.

Weather Protection

The most important weather protection for mature cattle is protection from the wind.

For winter calving herds, additional protection for calves from the cold is required during the calving season.

Straw packs and sheds are the most common protection for winter calving herds; there are specific calving areas for newborn calves and mothers. It is important for open sheds to face south to capture as much warmth from the sun as possible.

For summer calving herds, elaborate facilities are generally not required. Cows do not need bedding as they have a natural hair coat to keep them warm, even when laying in the snow. It is important to keep cattle clean as hair matted with manure reduces the natural insulation of the coats. Fat on well-conditioned cows is also a great insulator.

Wind protection is critical. If no natural wind protection is available, producers should construct windbreak fencing or plant a shelterbelt.

Wind chill on cattle has a significant impact as it causes major loss of body heat. Cows need additional energy to maintain themselves in cold windy conditions. Cows experiencing wind chill need additional feed; this increases a producer's costs. A rule of thumb is that for every 10°C below -20°C, you should feed an additional 3 kg of hay, or 6 kg of silage or 2 kg of grain to maintain the cows. Cattle fed insufficiently in severe weather can lose condition relatively quickly, which leads to reduced productivity.

In the CowBytes program, you can see the effects of feed requirements by adjusting the wind chill.

Sorting, Handling and Loading Facilities

There are many design systems for handling and working cattle. One of the most prominent people to research this area is Temple Grandin.

See detailed information on her website: http://www.grandin.com/

Most handling systems start with big pens and as you move closer to the handling area, cattle tend to be managed in somewhat smaller groups in smaller areas until they are directed to the chute for processing or loading.

Besides the actual design, a key part to a handling system is the chute and the restraining area. Squeeze chutes are a common restraining device. Affordability and the number of cattle you will be handling will determine how elaborate the chute you should purchase.

Safety of the operator and the animal are key elements of chute selection. Chutes must be sturdy and well-designed so they are safe for the operator and prevent him or her from being in a compromising position while restraining cattle. Also important are chutes that restrain cattle properly and provide emergency releases in case an animal does get caught in an inappropriate position. Research squeeze chutes and restraining systems before a purchase.

A scale is another important tool in a cattle management system; it allows you to gain more accurate information to make performance and marketing decisions. Although scales are a valuable tool, they are also quite costly. Rental may be a realistic option.

Watering Systems

Readily available water is a must for any cattle operation. Access to clean snow may be sufficient for cows, but for cattle in enclosed areas, or where snow is not always a guarantee, a watering system is required.

There are several different types of winter watering systems:

- Electric watering bowls
- Solar watering bowls
- Floating or submersible electric elements for water troughs
- Water cycling systems that have water constantly flowing through them so they never freeze; unused water returns to the well
- A dugout where ice is chopped is an option, but it is generally not recommended, as significant problems can occur if cattle break through thin ice. This type of watering process can also lead to manure-contamination of the water.
- Cost and reliability are key considerations for your operation.

For more information on winter watering systems, see the links in the reference section on the *Managing a Cow-Calf Business* CD as well as http://www.foragebeef.ca

Alberta Farm Animal Care has guidlines for producers to follow in terms of cattle handling, minimum space requirements, travelling times, rest times, and all other aspects of managing cattle on your farm.

This information can be found on their website at: http://www.afac.ab.ca/index.htm

For more specific information on the recommended code of practice for the care and handling of beef cattle, please see: http://nfacc.ca/pdf/english/BeefCattle1991.pdf."

Cattle Handling and Animal Behavior

When handling cattle, it is important to realize that cattle have panoramic vision; they can see all around them without turning their heads. They only have a blind spot directly behind them; therefore, quick movements in and out of this area may "spook" or stress the animals.

Cattle have a herd instinct; they tend to follow the leader. Cattle may become stressed or agitated if left alone.

Working cattle around bright light, or areas where there are contrasts in light and shadows, may make cattle more difficult to handle. Cattle may balk heading into a shaded area or being moved directly into the sun. Chutes that face north and south minimize some of the effects of the sun.

Cattle may also react to unusual objects, people or quick movements, whether it is people moving or something flapping in the wind. When handling and moving cattle, ensure the area you are moving them to is clear of people and moving or unusual objects (an unusual object may be something as simple as a bright orange pail carrying your medical supplies sitting by the post).

- Building chutes and crowding pens with solid sides is one way to reduce distractions to the cattle.

To see more information on cattle flight zones, see http://www.grandin.com/behavior/principles/flight.zone.html

Low Stress Livestock Handling and Flight Zones

The flight zone of an animal refers to how close you can get to the animal before it starts to move away. This flight zone varies with each animal. The flight zone for range cattle may be as high as 300 ft., while for cattle in a feedlot, it may be as low as 5 ft.

Flight zones can be influenced on a moment by moment basis. Strategically used, the human voice has tremendous influence on herd movement. For further study on cattle handling and low stress handling techniques, see http://www.stockmanship.com/index.htm

Once a handler has moved inside an animal's flight zone, the animal will move away. It is important not to enter an animal's flight zone too quickly as this will cause it to flee quickly and become stressed.

Move cattle from the edge of their flight zone, keeping them moving in an orderly way. As you move in and out of their flight zone, you can move the animals in the direction you want them to go without creating too much stress. As your experience grows, you will move the animal without actually realizing you are the one controlling the movement.

Low stress cattle handling involves control of animals based on your physical position around their flight zone. Ensure the cattle handling area is safe and free of obstruction or objects to cause stress. Avoid using noise, sticks or whips to handle cattle.

Safety

It is always a good practice to tell someone that you are working cattle.

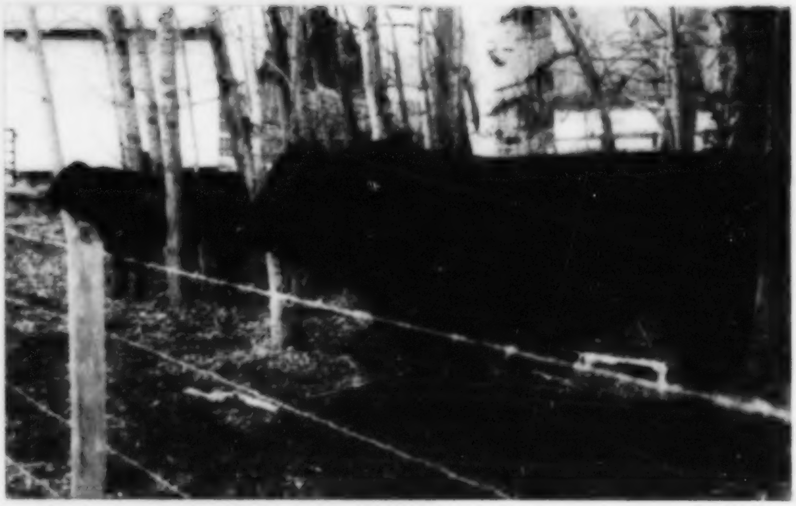
Calving Time

The temperament of a cow alters at calving time due to changing hormones and instincts.

- Cows may become aggressive, especially if you are near or handling their young calves. It is important to have another person around, or to be working with the calf in an area protected from the mother, especially if you are handling cows for their first time calving. Carry a stick to protect yourself when handling or checking cows during calving season.
- Common sense is key; do not put yourself into a corner or between a calf and a new mother.
- Have a contingency escape plan in place.

Bulls

The old adage, "never trust a bull," is good advice. Given a bull's size and strength, it may only take seconds to find yourself in serious danger. It is important to be aware of bulls at all times. Keep an eye on where they are and the way they are reacting to you being in their territory. Again, carry a stick when around or working with bulls.



- Even if you are comfortable with your herd bulls or have never had problems before, it is still important to be aware that they are unpredictable. One swing of a bull's head can do a lot of damage.
- As with handling any animals, use common sense and have a contingency plan.

Weaning Time

Weaning involves removing suckling calves from their mothers and converting them to a dry feed ration. Beef calves tend to be weaned at six to eight months of age, but this process can take place from four to ten months. Weaning may depend on the markets, feed availability, size and type of cows and calves, as well as the production system.

- Weaning calves too early may result in poorer performance from the calves. On the other hand, weaning calves too late can be harder on the cows, as they are feeding a large suckling calf, struggling to maintain their condition and likely feeding their unborn calves.
- Noise at weaning time is normal; whenever suckling calves are separated from their mothers, excessive "bawling" (cows calling their calves) occurs. It will last longer if calves are present to respond but will generally last two to three days.
- Sturdy facilities are very important at weaning time. Solid corrals and gates are critical. A loosely tied gate, or poorly maintained corrals, will likely not keep a newly-weaned calf separated from its mother. Calves will also find a way through a typical wire fence after being weaned.

There has been research done on low stress weaning methods, by finding ways to wean calves without having to separate them from their mothers. For more information see the links in the reference section on the *Managing a Cow-Calf Business* CD.

Feeding

In Alberta, the main types of feed provided to cattle are:

- Silage
- Greenfeed
- Hay
- Straw
- Grain/pellets.

For more information on these different types of feed, see the reference section on the *Managing a Cow-Calf Business* CD. Search on http://www.foragebeef.ca or study the topic within the Nutrition section.

Weaning is a high stress time, especially for calves; therefore, it is critical that calves have access to plenty of water and good feed–preferably roughage–to reduce their stress, and to reduce overall performance losses in newly weaned calves.

Feeding Methods/ Systems

As discussed earlier, it is common to feed cattle out in fields throughout the winter feeding period. Therefore, spreading feed (generally roughages) on the ground is common.

- Most hay is laid on the ground with a processor, unrolled on the ground or dropped as whole bales for cows to eat from.
- Feed can also be placed in feeders, on the range, or in corrals.
- Cattle in corrals tend to be fed either from feeders or from bunks on the edge of the corral. With feeders, it is important to monitor the amount of waste that occurs from a pile-up of feed getting trampled around the feeder.

There are feeding systems designed to allow the producer to deliver feed every other day; this reduces costs. Using electric fences to limit access to feed is a very good option. This could be accomplished with a wire across a pile of silage or chaff, or by placing bales around a field and moving the electric fence to allow cows access to only the required amount of feed for a day or two.

Feed Storage

Feed storage area development is an important part of a cattle operation. Select an area that is practical to access at all times of the year and well located in relation to the feeding grounds. Secure the site to keep cattle contained and wildlife out. Another key to efficient feed storage is to economically reduce feed waste.

- For silage, whether in bales or in a well-sealed pit or pile, ensure that drainage is effective to reduce feed waste.
- For hay or greenfeed, consider a shed or tarp to protect the feed. The amount and quality of feed used, and the length of time it is stored, determine how significant an investment should be made in storage infrastructure.
- Select a large area to allow placement of bales in rows rather than stacks. For bales that are stacked, the runoff on one bale will flow onto other bales which increases storage losses.
- Square bales absorb rainwater very easily. Consider tarping square bale stacks or build a bale shed for longer term storage. Bale sheds are advantageous for storing hay because they offer sound storage options. Storing feed over from one year to the next can be effective insurance against poor growing conditions the following year.
- Bins are generally used for grain storage, but piling feed grain is also an option. If grain is piled in fall, it is best to use or move the grain before the following spring to reduce losses.

For more information on feed management and storage, see the links on the *Managing a Cow-Calf Business* CD.

Feeding Equipment

Equipment varies depending on the selected feeding system. You will find everything from the use of horse and sleigh to deliver feed to cows, to large tractors, feed wagons or shredders delivering feed. The choice is generally a function of economics and labor.

In most cattle operations, if you are handling large bales, a tractor and front-end loader are necessary. Bale shredders have become quite common for feeding and processing hay, but research has shown that when ground feeding shredded feed, losses are higher both in quantity and quality compared to ground feeding directly from the bale.

Silage tends to be fed with a feed wagon which also works well for mixing different types of ingredients in a ration.

Equipment purchase is expensive. First, determine if the equipment is really required or if other less expensive cattle feeding methods exist.

With any feeding system, it is critical to assess feed losses. Losing 20 percent or more of your feed through poor storage or inappropriate feeding practices is not uncommon and can significantly increase your feed costs and decrease your profitability.

See the links on the *Managing a Cow-Calf Business* CD and browse through the information at http://www.foragebeef.ca regarding feed loss management.

Natural Resources Conservation Board Offices:

Calgary
Phone: (403) 662-3990
Fax: (403) 662-3994

Edmonton
Phone: (780) 422-1977
Fax: (780) 427-0607

Fairview
Phone: (780) 835-7111
Fax: (780) 835-3259

Lethbridge
Phone: (403) 381-5166
Fax: (403) 381-5806

Morinville
Phone: (780) 939-1212
Fax: (780) 939-3194

Red Deer
Phone: (403) 340-5241
Fax: (403) 340-5599

Regulations

Regulations on site development of a livestock operation are found in the *Agricultural Operation Practices Act* (AOPA). The Natural Resources Conservation Board (NRCB) administers the regulations under AOPA. As previously discussed, AOPA balances environmental responsibilities with the realities of agricultural production.

The main provisions of the Act include:

- Protection for farmers from unwarranted nuisance lawsuits
- A mechanism for resolving nuisance disputes between agricultural producers and their immediate neighbors
- Protection of ground and surface water by proper management of manure and animal waste.

Depending on the size of your operation and location, there may not be any permits required, but it is best to contact the NRCB before starting construction.

http://www.nrcb.gov.ab.ca

Offices in Calgary, Fairview, Morinville, Edmonton, Lethbridge and Red Deer

Key Points

- When are you planning to calve?
- How big of a herd are you planning to have? Smaller herds will have to limit capital investment in order to keep costs reasonable.
- Where will your site be located?
- Will you feed the cows on the range, in a field or in corrals?
- What are you doing for wind protection?
- Is other weather protection required?
- What will your handling system look like?
- How will you restrain animals that need to be worked on?
- Do you understand flight zones and how to use them?
- Can you sense when you are entering an animal's flight zone?
- Do you have pens for your bulls? Calves?
- How are you going to water the cows in the winter?
- What types of feed are you going to use?
- How are you going to feed the cows?
- Do you have a feed storage site selected?

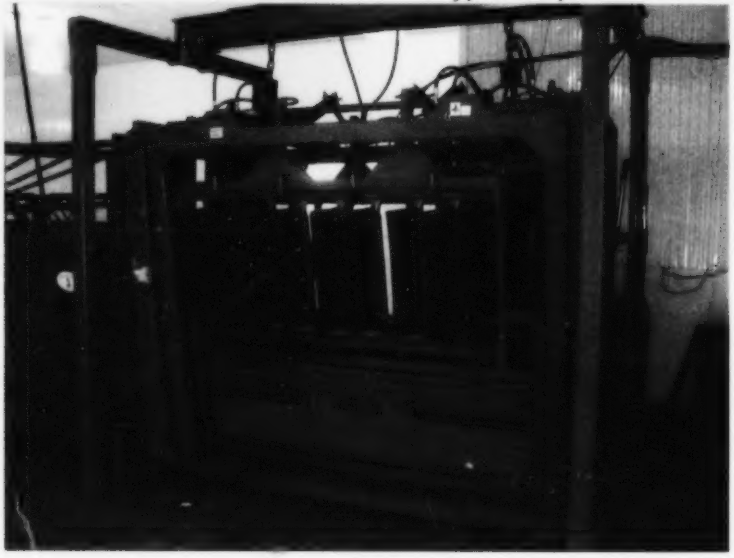
Summary

Although there are a variety of topics and a wide array of information regarding cattle facilities and feed management available, there is no straightforward blueprint when it comes to cattle management and feeding. There is a significant amount of research and information available on all of the topics discussed in this section. Complete additional research on topics about which you are unsure, so that you are comfortable with your facilities and feeding system.

In general, there are two broad approaches to cattle systems Capital intensive systems require high output from available resources. Capital intensive systems use more infrastructure and equipment which require higher productivity from a large number of high performance calves.

More extensive operations, with cattle grazing as many days as possible, use minimal infrastructure as cows look after themselves calving on pasture and require minimal maintenance throughout the winter because they are just in their second trimester through the harsh weather. Labor and capital investment are lower. Production in these systems is not maximized, but is offset by the lower cost structure of the operation. With proper management, both of these systems can be successful.

Typical squeeze chute



Getting Started
Building Your Plan

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Learning Objectives

The producer will:

- *Apply what was learned in the manual*
- *Put the key components together for his or her operation.*

Overview

This manual introduced many topics and considerations related to managing a cow-calf operation. As you have seen, there is no cookie cutter approach to starting your own operation, and there are no "silver bullets" to ensure your success. The key is to have a plan for your operation, and to understand how your management decisions in all areas are linked to the overall performance of your business.

Planning is an ongoing process in a successful business. It's important that you do things right but also that you do the right things. Your ability to adapt to changing market signals, environmental and production challenges, and economic conditions ultimately determines the long-term success of your business.

This section begins with some introductory questions that outline the general parameters of the operation in terms of production, marketing, economics, human resources and environmental management. Answering these questions will lead you to information and questions specific to your operation.

Operation Basics:

My goal in 5 to 10 years is to ______________________________

I plan to have this many cows: ________________

I will use these breed(s): ______________

I want my calving season to be from ________ until ________

I plan to sell my calves ________________

The method I will use to sell my calves will be ________________

I will manage my market risk by ________________

The facilities I require are ________________

The pieces of equipment I require are ________________

My cows will graze ______ days

I will extend the grazing season by ________________

My cows will be on feed for this many days: ________________

My main feed source will be ________________

My net worth is ________________

My debt to equity is ___________________

My cost per cow per day is ________________

My cost per lb. of calf weaned is ________________

My expected return to equity is ________________

I will keep records using ___________________

The three biggest risks I face are:

- ________________
- ________________
- ________________

Number of employees needed ________________

My veterinarian will be ________________ or ________________

My vaccination program will consist of ______________________________

Environmental concerns for my property are ______________________________

Big Picture Management

What is the **vision** for your cow-calf operation?

Goals

Business Goals

Short-term	Long-term
1)	1)
2)	2)
3)	3)

Family Goals

Short-term	Long-term
1)	1)
2)	2)
3)	3)

Personal Goals

Short-term	Long-term
1)	1)
2)	2)
3)	3)

Have you answered the following three questions with regard to strategic and operational planning for your business?

- Where am I now? ☐
- Where do I want to be? ☐
- How am I going to get there? ☐

To meet your business goals:

- Do you have objectives? ☐
- Do you have an action plan? ☐
- Do you have performance measures? ☐
- Do you have a process to review your results? ☐

Operating Plan

This is the combination of all the remaining sections.

Succession Planning

Has each member of the family completed his or her set of business, family and personal goals?
Have they been communicated and discussed with everyone?
What type of timeline are you dealing with for the succession plan?
Be sure to address everyone's concerns and issues.

Farm Ownership

Do you understand the different types of farm ownership?
Have you considered the implications of the different types of farm ownership on the following topics:

- Estate planning
- Credit management
- Strategic management (for example, joint venture or co-ownership)
- Income tax planning
- Succession

Genetics

Are you familiar with the main breeds in Alberta?
Do you know which breeds work well in your area?
How are you going to source your breeding stock?
Do you understand the following traits and their implication for profitability?

- Fertility
- Cow size
- Milk production
- Adaptability and hardiness
- Polled versus horned
- Carcass composition
- Temperament

What are the strengths and weaknesses of these characteristics as far as the breeds you are considering?
Once you have selected your breed, do you have guidelines or minimum/maximums for these traits?

- Birth weight
- Weaning weight
- Average daily gain
- Mature weight
- Rib eye area
- Testicular development

Do you understand expected progeny differences (EPDs)?
How are you going use EPDs in selecting your herd?
Do you understand hybrid vigor?
Do you have a breeding plan?
What breeds are you going to use in your operation?
Are you going to retain heifers or purchase them?
Are you going to use all natural service or some artificial insemination?

Nutrition

What are the basic features of a ruminant?
Identify the main source of energy for your cow-herd.
Identify the main source of protein for your cow-herd.
Do you understand the concept of first limiting nutrient?
How are you going to balance the minerals and vitamins for your cattle herd?
Where are you going to test your feed?
Have you estimated the amount of feed you are going to need for the winter?
Do you know the difference between feed sources such as silage, greenfeed, hay/alfalfa, pellets, grain and other alternative feeds?

- Do you have the right type of facilities to handle these different feed sources?
- What is the cost/cow/day for these different rations?

How are you going to balance your rations?
What is the basic process for balancing a ration?
Do you have enough water?
What is the quality of your water?
Do you understand body condition scoring and how to use it in managing your cattle in terms of ration development and economics?
Do you monitor your cattle's manure? A change in consistency may be a sign that the ration may need to be adjusted.
How will the type of cattle you select, in terms of breed and genetics, influence the quantity of feed and rations you develop?
How will the timing of your calving season affect your total feed requirements?
Have you considered the feed requirements for your bulls, heifers and calves, as well as possibly dividing the herd into feeding groups?
Are you aware of feed regulations?

- Do not mix feeds for different species!

Have you used the *CowBytes* software ration program or other rationing software programs?

Reproduction

Can you explain the reproduction cycle?
Are you familiar with the specifics of the reproduction cycle as it relates to cattle (gestation periods, rebreeding intervals, age to breed heifers, etc.)?
How long after calving do you want your cattle to be bred in order to maintain an efficient reproduction cycle?
What time of the year do you plan to calve your cows? When will you turn out the bulls?
Have you considered facility and labor requirements, marketing plan and economics when choosing your calving season?
Do you know how to recognize the signs that a cow is starting to near calving?
Do you have a plan if you require help with a calving?
Do you know what characteristics to look for in a bull?
Do you have a target for your herd's conception rate?
Have you considered the management requirements for a young herd bull?
How many bulls do you need?
Do you have a plan if your pasture requires more than one bull for the breeding season?
Do you know how to manage cows' nutrition as the females move through the stages of their production cycle?
Are you going to retain heifers, or buy in females?

- If retaining heifers, have you planned how you will manage their nutrition requirements?

Are you familiar with the reproduction cycle of heifers (2 years of age to calve)?
When selecting the genetics for your herd, are you considering your female offspring of your genetic selection? (This only applies if you plan to retain your own females.)
Do you have criteria for culling animals?
Be sure to monitor your cow's reproduction.

- How long after calving are they cycling?
- Are the bulls being managed properly?
- How many cows are cycling more than once after being exposed to the bull?

Do you have a target for the length of your calving season?
When are you pregnancy testing?
What methods are you going to use to castrate your bull calves?
Are you aware how management of genetics and nutrition can affect your reproduction efficiency?
Do you understand how poor reproduction will decrease the profitability of your cow-calf operation?
Are you aware that having a short calving season will also help the marketability of your calves?
Are you aware of the reproduction diseases that exist?

Herd Health

Do you have a herd health plan?
What people or information are you going to use to develop this plan?
Have you met and talked to local veterinarian(s)?
Can you spot an animal that looks sick?
Do you know the "normal" vital signs of a healthy animal?
Can you list the three factors to consider for animal assessment?
How are you going to track the treatment of your animals?
Do you have vaccination and parasite control protocols?
Do you know how to manage your animals in order to get the best results from vaccinations?
Do you know which vaccinations you can use on your cows that will add protection to your calves?

- Can you use the vaccinations on pregnant cows?

Does your parasite control function against both internal and external parasites?
When are you going to vaccinate your animals?
Do you know the advantages of using modified live vaccines (MLVs)?
Do you know when you can and can't use MLVs?
Do you have protocols for treating sick animals?
Do you know the difference between intramuscular and subcutaneous injections?

- Do you know the proper way and location to administer these types of injections?

Do you have the facilities to properly treat animals?
What are you going to do if an animal does not respond to its treatment?
Are you familiar with the main infectious and non-infectious diseases?
Are you familiar with the internal and external parasites?
Do you know what diseases are reportable?
Can you define a zoonotic disease?
Do you know some of the key signs of diagnosing specific types of diseases or common signs of a sick animal?
Have you considered digestive diseases when developing your nutrition plan, as well as your feeding facilities?
Can you diagnose dehydration in calves?
Can you handle a difficult calving?
Do you have a first contact when a difficult calving occurs?
Have you tried to build some experience with calving before starting your first calving season?
Do you understand the importance of a proactive herd health plan, as well as the economic losses that occur from poor herd health?

Grazing Management

Do you know where you are going to pasture your cows?
In what condition are those pastures?
Do you know what types of species of forage are in the pasture?

- Is it tame or native pasture?

Do you understand the importance of choosing a proper turnout date for your cattle?

- Do you have someone to assist you with pasture management decisions?

Do you have a grazing plan?
Do you have the ability to rotate cattle around your pasture thus allowing the pasture species to rest?
Do you have a targeted number of days for grazing?
Can you apply the concept of grazing all species as quickly and evenly as you can in a paddock, and then moving cows along to the next paddock?
Do you know how to determine the optimal time to move cattle?
Do you understand the importance of resting plants after grazing?
Do you understand species succession?
How are you going to manage species succession in your grazing system?
Do you have areas of your pasture with significant non-desirable species?

- What are you going to do to manage these areas to increase productivity?

Do you understand stocking density?
Do you understand stocking rates?
Can you explain the difference between stocking rates and stocking density?
Have you estimated forage yield for your pasture?
Have you estimated stocking rates for your pasture?
Do you understand the importance of proper livestock distribution?
How much water will you need to supply this year and in the future?
What type of water sources and system are you going to use in your pasture?

- What power source are you going to use for your pasture watering system?
- What will be the distance your cattle will have to travel to water?
- Will they be drinking from a trough?

Do you know the implications if they are drinking directly from the water source?
Do you have riparian areas in your pasture that will need to be managed?
Do you understand the nutrient cycle in a pasture system?
Have you considered how well your grazing system will capitalize on the natural nutrient cycle that exists?
Are you going to use legumes in your grazing system?
Do you know what bloat is and some ways to manage it?
What types of species work best in your area?
Do you need to establish new pasture?
Do you need to rejuvenate pasture?

- Do you know the techniques to rejuvenate pasture?

Have you looked at the alternatives to extend your grazing season?
Is there a grain farmer in your area that you could work with on field operations, or to use some of their crop residue for feeding your cows?
Do you know when your pastures' peak forage production will likely be?

Have you developed some strategies for dealing with excess grass production?
Are you familiar with the opportunities such as:
- Running grass cattle
- Mechanically harvesting excess production
- Stock-piled grazing
- Adjusting the calving season.

How many paddocks are you going to have?
What needs to be done to divide the pasture into different paddocks?
- Permanent fencing? Electric fencing? Water requirements?

Have you considered the different types of species and land productivity when developing your paddock setup?
Do you know how to set up an electric fence?
Have you calculated the economic benefits of an extended grazing system?
Have you considered the cattle nutrition requirements for these extended grazing systems?
Can you calculate the economic benefits of making changes to your grazing system?

Environmental Best Management Practices

Is there any evidence of soil erosion on your property or property you will be managing?
Are there areas that will need special management because of eroded soils or sensitive soils?
Do you know some of the management strategies to reduce the impact on sensitive soils?
Can you recognize the symptoms of soil compaction?
- Do you know the management strategies to reduce soil compaction?

Are you considering how to improve soil organic matter when looking at different grazing management and land management strategies?
Do you have open bodies of water on or near your property?
- How are you managing the risk of possible contamination of the water?
- How are you managing the water body and the area around it to ensure it will be well preserved?

Are you familiar with proper management systems to avoid contaminating groundwater sources?
Are you aware that ruminants produce methane?
Do you know how feeding management can reduce methane emissions from cattle?
Can you define biodiversity?
Have you considered how your management system will impact the biodiversity of your property?
Can you list the environmental functions that are performed by having an optimal mix of species?
If or when you use pesticides, are you comfortable handling them?
- Do you know how and where you will store them?
- Are you aware that some pesticides have a withdrawal time in plants?

Do you know that pathogens exist in manure and can contaminate water if they reach water?

- Do you know the management methods to block disease transmission?

Have you considered environmental impacts when selecting your cattle operation site?

- Where will you build the wintering site?
- Where will you build your feed storage site?
- What is the slope and topography of these sites?
- How does the drainage run in comparison to where possible water bodies are?
- Have you considered management strategies with regard to your cattle operation that may make the buildup of manure less dense at your wintering site (types of facilities, calving season, extended grazing, etc.)?

Do you have sufficient water at your cattle facilities and wintering site?

Have you eliminated direct access to all water bodies from the cattle?

Do you know how vegetation management around water bodies helps to protect the water bodies from contamination?

How are you going to manage manure from these sites to improve soils and decrease risks of run-off and leaching?

Are you familiar with all of the practices for managing manure and compost?

Have you considered stock piling or composting your manure?

Have you researched the type of soil at this site in order to reduce environmental risks?

Do you know the importance of proper grazing management as it relates to environmental management?

Are you aware of the different types of burrowing animals that can intrude on your property?

- Do you know the methods available to control them?

Do you have your feed sources managed to minimize the damage from wildlife?

Are there predatory animals you should be aware of in your area, for both yourself and your livestock?

Are you aware of the risks of buying feed sources?

Do you know where you will be disposing of hazardous waste from your farm?

Are you familiar with all the regulations regarding dead animal disposal?

Do you have a plan for disposing of dead livestock?

Have you considered the implications of your operation on neighbors?

Do you know that you can reduce conflict with neighbors regarding environmental issues through proper management?

Are you familiar with the environmental regulations that exist?

Do you know the consequences if you do not follow the regulations?

Have you also considered how improving environmental stewardship can have economic benefits as a result of healthier pastures, cleaner water and improved animal performance?

Marketing

Can you define marketing?
Do you know the difference between marketing and selling?
Do you know the difference between commodity marketing and niche marketing?
Do you have information sources to keep up to date on local markets, as well as North American markets?
Do you know the basics of how the futures markets work?
Do you understand the beef supply chain?
Have you considered how different production decisions, such as calving times, affect your marketing choices?

- Are you going to calve early or calve later and potentially put cattle on grass the following year?

Can you explain the cattle cycle?
Do you understand why there is such a lag between production decisions and cattle supply?
Are you aware of the importance of the US market to the Canadian market?
Do you understand how changes in the Canadian and US exchange rates affect the Canadian market?
Do you understand how changes in the Canada US basis affect the Canadian market?
Do you understand how the principles of "perfect competition" work in the cattle industry, especially at the cow-calf and cattle feeding levels of the supply chain?
Are you, and do you know why you should be, following these conditions:

- Cattle supply
- Feed costs and cost of gain
- Grazing conditions (especially in the main cattle producing states)
- Cattle prices, feeder prices, slaughter cattle prices
- Seasonal production patterns and trends
- Profitability in the cow-calf sector as well as profitability in the feedlot and packing plant sectors
- Consumer demand
- Exports.

Do you understand, and can you use, the feeder price formula?
Do you know your cost of production for the different marketing alternatives?
What are your cash flow requirements?
Do you have all the required documentation and tagging in place for the cattle you intend to market?
Are you aware of the difference between steer and heifer prices?
Have you considered which marketing attributes you will pursue with your cattle?

- Have you considered which ones will work best for your operation, as well as the ones that will have the best economic impact on your operation?
- Are you aware of the risks and benefits of pre-conditioning your calves?
- Do you have contacts for sourcing reputable genetics for your cattle herd; have you considered this in your marketing plan?
- Are you aware of the type of cattle that are in biggest demand by the feedlots?
- Are you going to sell heifers as feeder calves or into the breeding market?
- Have you looked at value chains or niche markets?

What method are you going to use to sell your calves?

- Auction market, satellite or internet, privately, etc.

Are you going to sell your cattle at weaning time, are you going to background or will you retain ownership?
Do you have a plan for selling your cull animals?
Are you aware of the risks that exist in the cattle markets?
Are you monitoring the areas that put your operation at the most risk?
How are you going to reduce the risks to which you are exposed?

Finance and Economics

Are you familiar with the key terms at the start of the finance section?
Are you familiar with financial statements?

- Balance sheet
- Income statement
- Cash flow statement

Do you know the difference between a balance sheet and a net worth statement?
Can you calculate gross margin, contribution margin and net income for your operation?
Do you know your current financial position or "net worth"?
Have you done an income statement and cash flow statement for your cattle operation?

- Do you have some periods where you will need additional cash?

Do you know what ratio analysis is?
Can you calculate these ratios?

- Current ratio
- Debt service ratio
- Debt to asset ratio
- Debt to equity ratio
- Return on assets
- Return on equity

Do you know the value of these ratios for your operation?

Would you be comfortable talking to your banker about these calculations?
Do you understand what a bank considers when deciding whether to lend money or not?
Do you know what the terms and interest rates are for your operation from the different banks?
Do you know what enterprise analysis is?

- Do you know what enterprises exist on your farm?
- Do you understand opportunity cost?
- Do you know how to evaluate different components of your business using enterprise analysis?
- Have you allocated costs on your farm between enterprises?

What is your cost of production?
Have you calculated your unit cost of production ($/lb., $/tonne)?
Do you understand how changes in production numbers affect your cost of production?
What is your estimated profit in $/lb. of calf weaned?
Have you calculated your break-even price or yield?

- Have you done this for each enterprise?

Do you understand benchmarking?
Have you found industry benchmarks with which to compare yourself?
Have you considered yardage costs when developing production and marketing plans?

- Do you know what costs are included in yardage costs?

What capital investment costs are you considering for your operation (land, buildings, machinery, pasture infrastructure, etc.)?
Do you know what methods to use to evaluate these costs?
Do you know a professional who could maybe assist you with these decisions?
Have you discussed your operation or plans with an accountant?
Do you have a system for keeping records of your financial information as well as production information?
Have you considered the different sources of risk when doing your different scenarios?
Do you understand how production risks such as death loss, poor reproduction, low weight gains and drought impact your economic returns?
Have you considered the marketing risks in your plans?
Have you used sensitivity analysis when assessing different scenarios?
Have you evaluated different alternatives such as renting land, custom feeding, leasing cattle, running grass cattle or different arrangements for sourcing feed in order to make your operation more profitable or improve cash flow, especially in the startup phase?

Human Resource Management

Have you developed a human resource plan?
What type of rewards are you going to have for your employees?
Do you have job descriptions for everyone working on the farm?
Have you looked at “total compensation” when considering the costs of hiring and having employees?
Do you have a system for evaluating employees, and do the employees understand how they will be evaluated?
Have you set goals with the employees?
Are you familiar with the key areas to focus on to maintain employees?
Are you aware of the regulations you must follow as an employer?
Do you have policies and procedures for employees to follow?

Cattle Handling and Feeding Management

Given your production and marketing plan, are you going to have significant facilities and buildings or have limited facilities?
Have you chosen a plan for your corrals?
Have you looked over several facility options in order to reduce costs?
Do you have your site selected?

- Is it easily accessible?
- Will it be at risk of contaminating water?

Are you familiar with what the general facility requirements are for winter calving as well as for summer calving?
Have you planned for a possible expansion of your facilities?
Have you planned for bull pens, feeder calf pens or heifer pens that may be required?
Do you have good wind protection for your cattle?
If winter calving, do you have good protection for newly born calves?
Are you aware of the additional feed requirements for windy and cold conditions?
Have you researched different types of handling facilities, as well as restraining systems?
Have you kept operator, as well as animal safety, in mind when choosing and developing your facilities?
Do you have a watering system for your cattle?
Have you chosen a watering system that will withstand extremely low temperatures?
Have you developed your facilities in such a way to reduce the amount of distractions to cattle?
Do you understand flight zones and how to move cattle by moving around their flight zone?
Are you aware of safety issues with cattle, especially at calving time and when handling bulls?
Have you developed facilities that will allow for easy escape by people handling the cattle?
Do you have facilities that will handle cattle at weaning time?
Given your production and marketing plan, do you know approximately when you will be weaning your calves?

Are you aware of the stress that weaning causes calves and have procedures in place to reduce this stress?
Do you know what your main source of feed will be?
Do you have a storage site for this feed?
Have you researched techniques to reduce feed wastage?
What type of equipment are you going to need to feed your cattle?
Do you have an open area to feed the cattle to reduce the amount of time they are in a confined area?
Have you considered swath grazing and other extended grazing systems to reduce investment in facilities?
Have you calculated your yardage costs for different feeding operations?
Are you aware of the feed regulations associated with different types of cattle feed?

Conclusion

Now that you have worked through this checklist and are comfortable with the concepts discussed, you should have a better understanding of the different topics in this manual and the way they impact your operation. It should be clear that all aspects of cattle production, grazing management, marketing and environmental management impact the profitability of your operation. As you build your business and gain further experience, you will simply be adding to and adapting these principles, to continually improve your cow-calf operation and ensure its long-term sustainability.